FIG.1

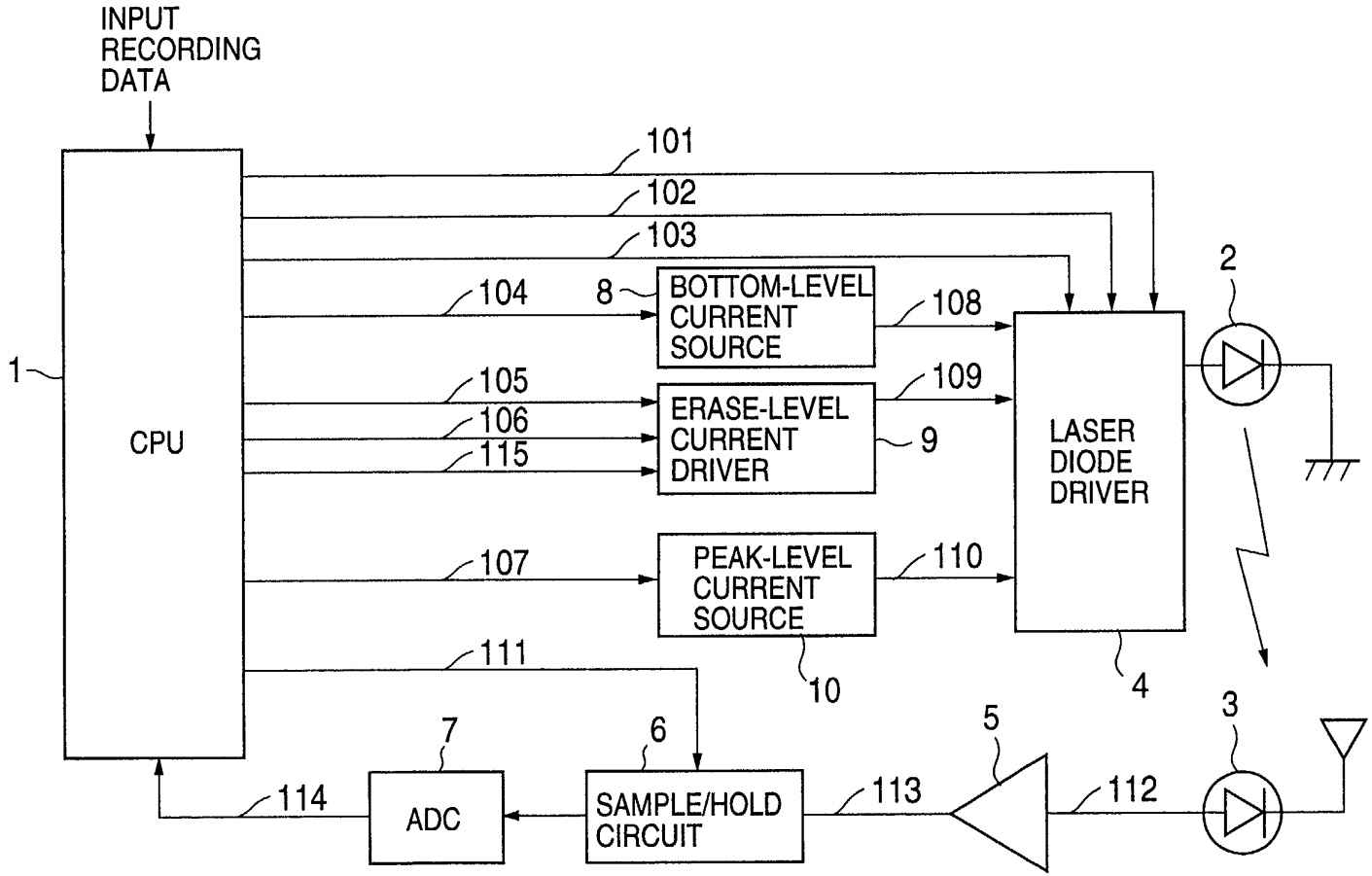
INPUT
RECORDING
DATA
CPU
1
101
102
103
104
105
106
115
107
111
114
8
BOTTOM-LEVEL
CURRENT
SOURCE
ERASE-LEVEL
CURRENT
DRIVER
9
PEAK-LEVEL
CURRENT
SOURCE
10
108
109
110
LASER
DIODE
DRIVER
4
2
3
5
6
7
ADC
SAMPLE/HOLD
CIRCUIT
113
112

FIG.2

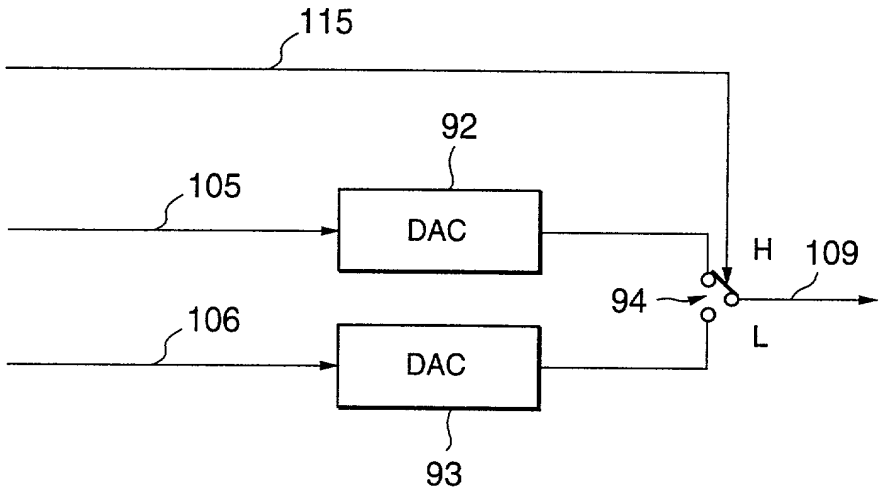

FIG.3

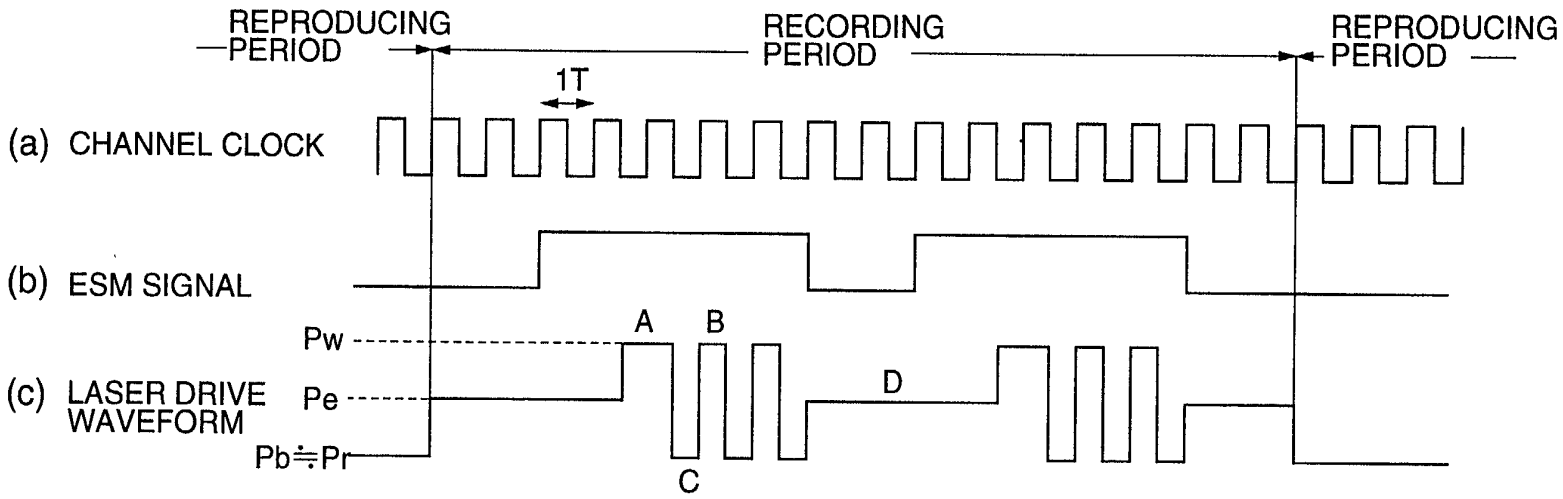
REPRODUCING PERIOD
RECORDING PERIOD
REPRODUCING PERIOD
1T
(a) CHANNEL CLOCK
(b) ESM SIGNAL
(c) LASER DRIVE WAVEFORM
Pw
Pe
Pb≒Pr
A
B
C
D

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FIG.4

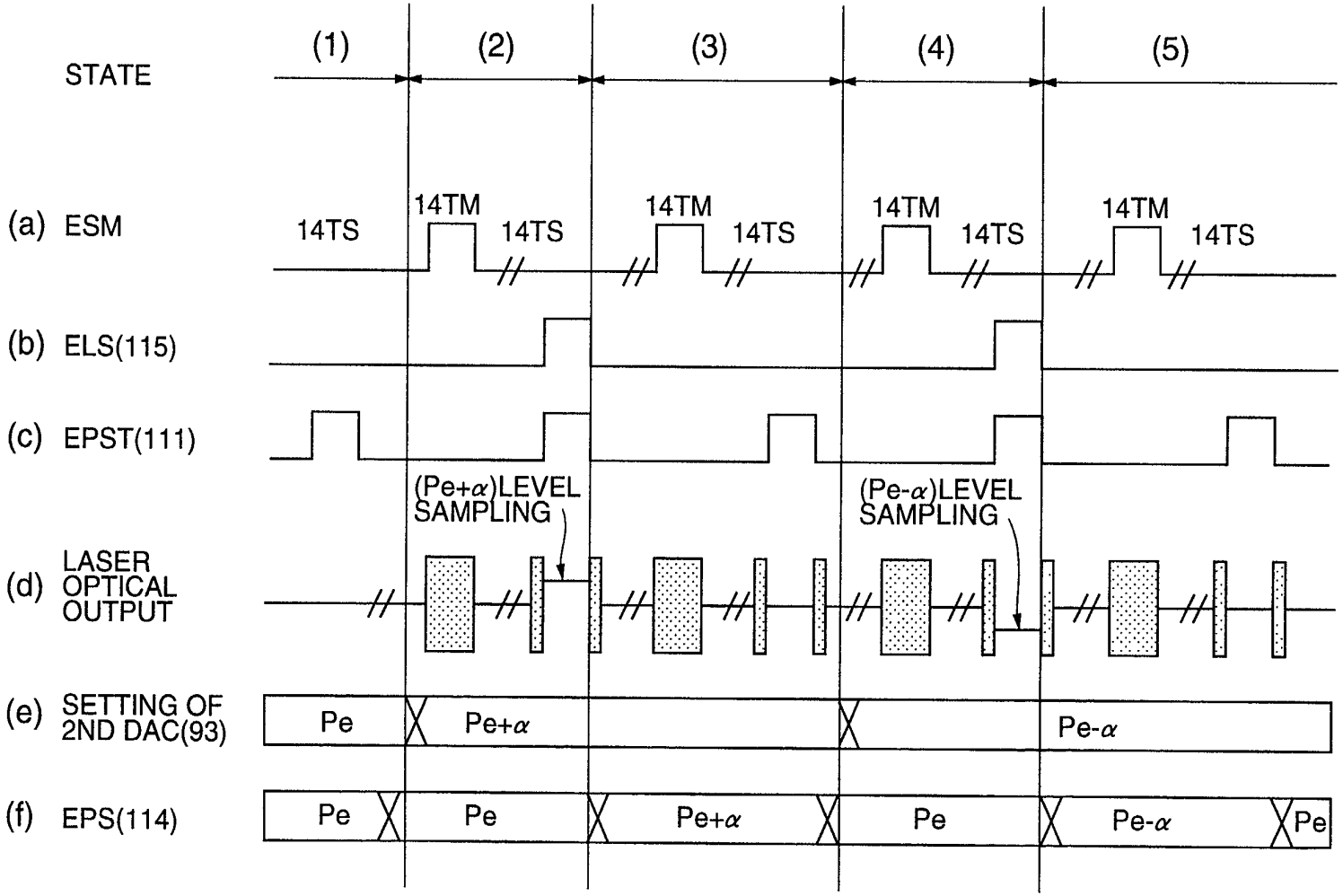


FIG.5A

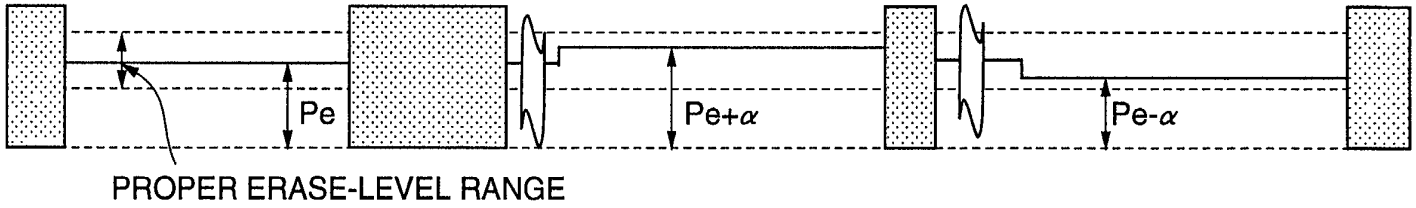


FIG.5B

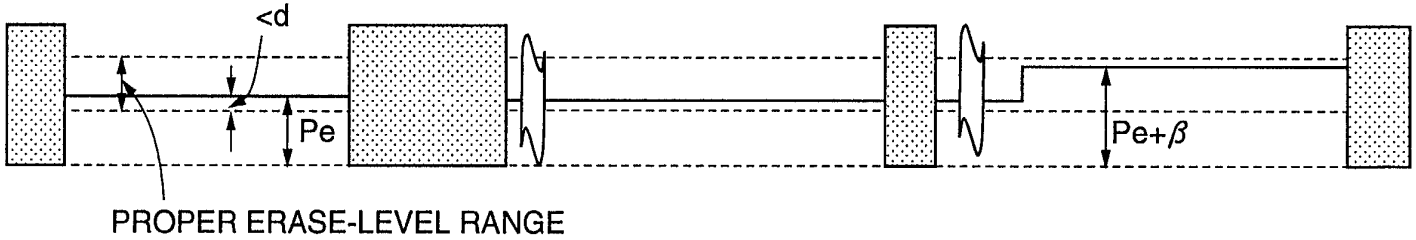


FIG.5C

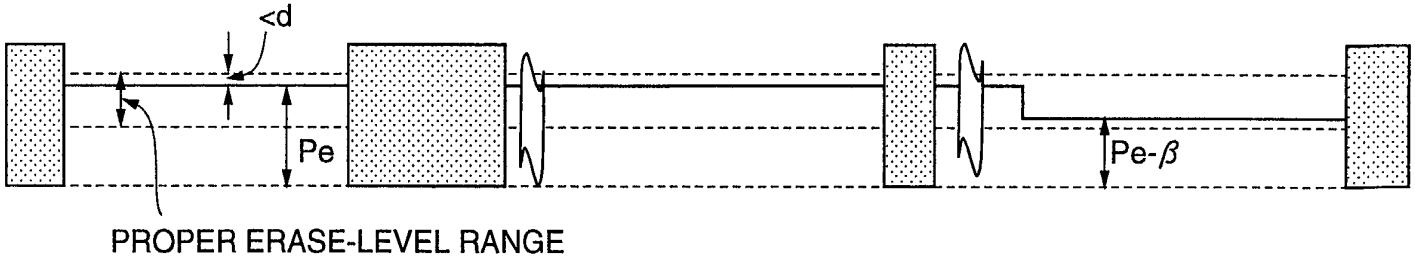


FIG.6

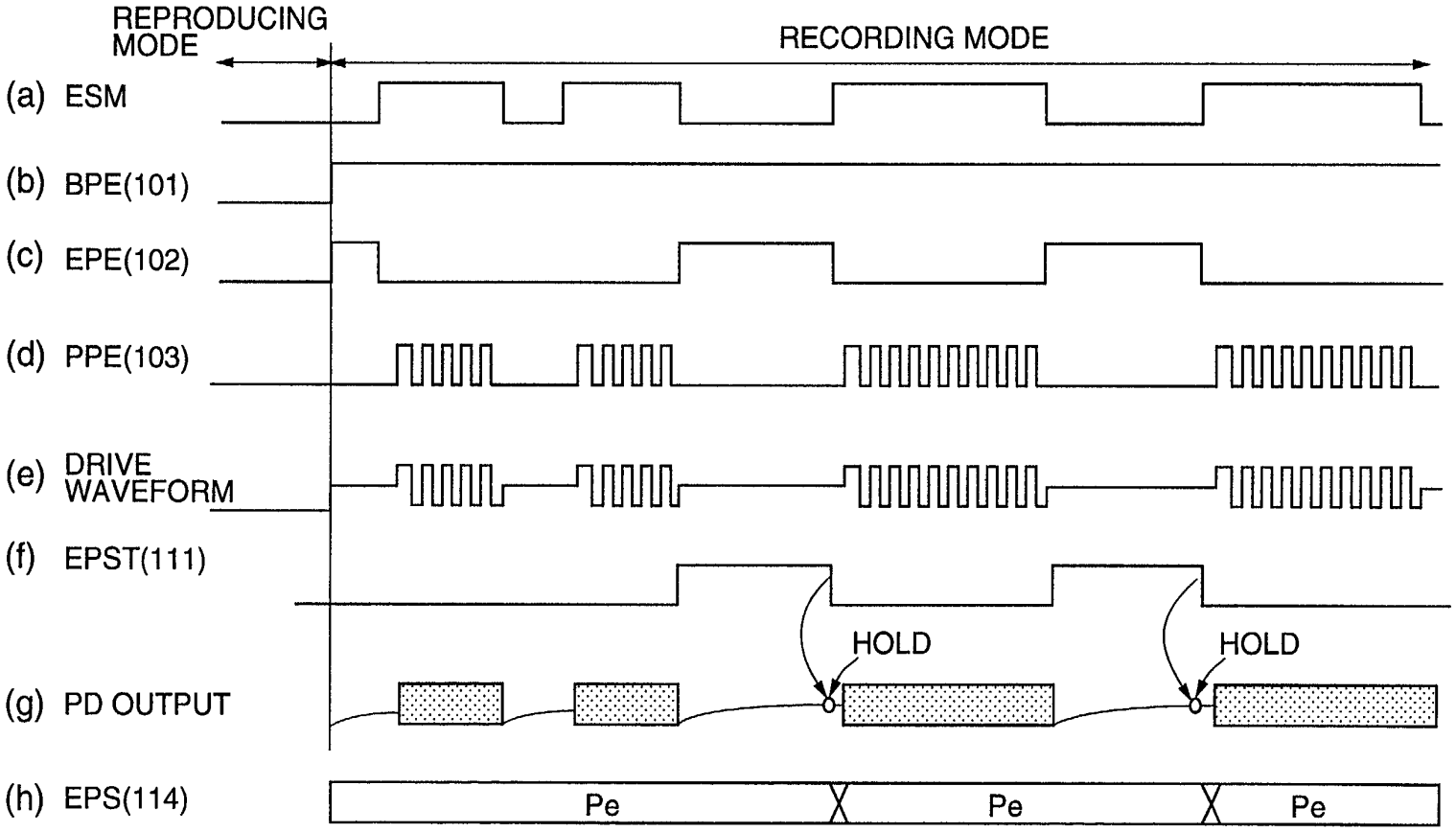

REPRODUCING MODE
RECORDING MODE
(a) ESM
(b) BPE(101)
(c) EPE(102)
(d) PPE(103)
(e) DRIVE WAVEFORM
(f) EPST(111)
HOLD
HOLD
(g) PD OUTPUT
(h) EPS(114)
Pe
Pe
Pe

FIG.7

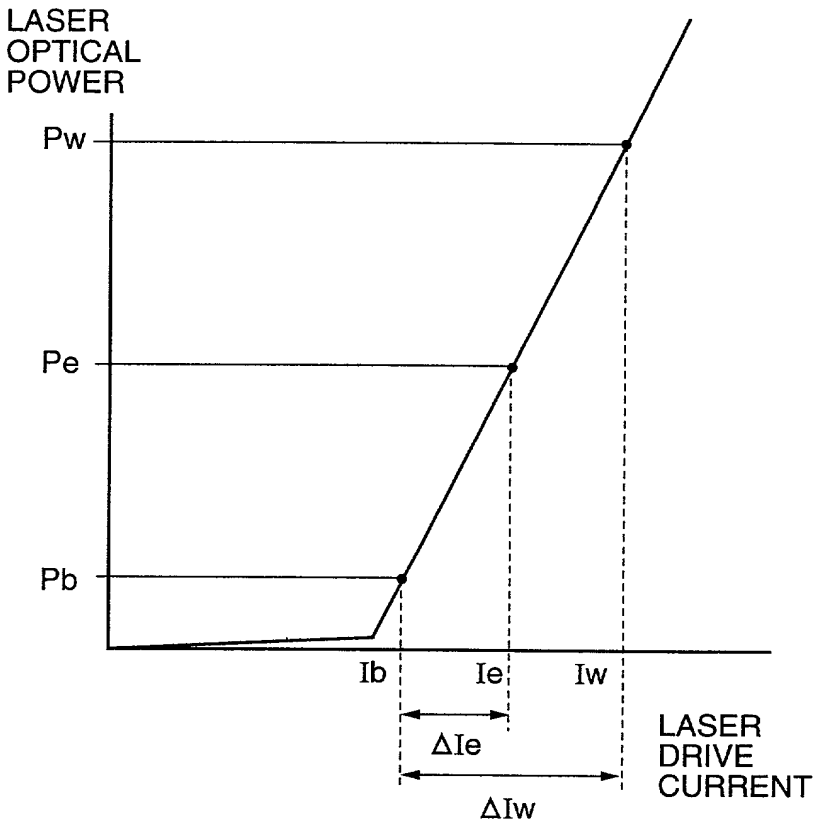

LASER
OPTICAL
POWER
Pw
Pe
Pb
Ib
Ie
Iw
ΔIe
ΔIw
LASER
DRIVE
CURRENT

FIG.8

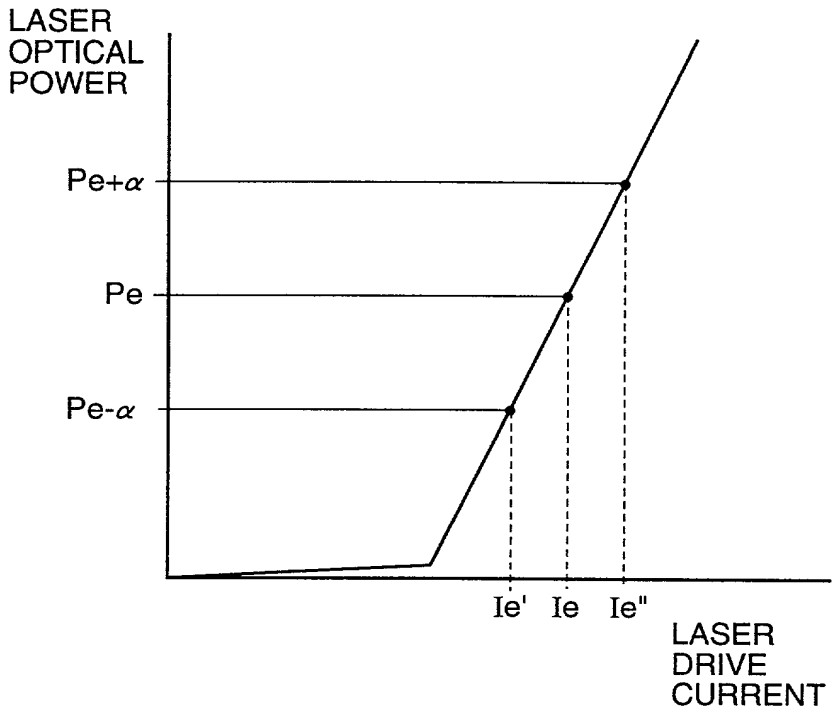
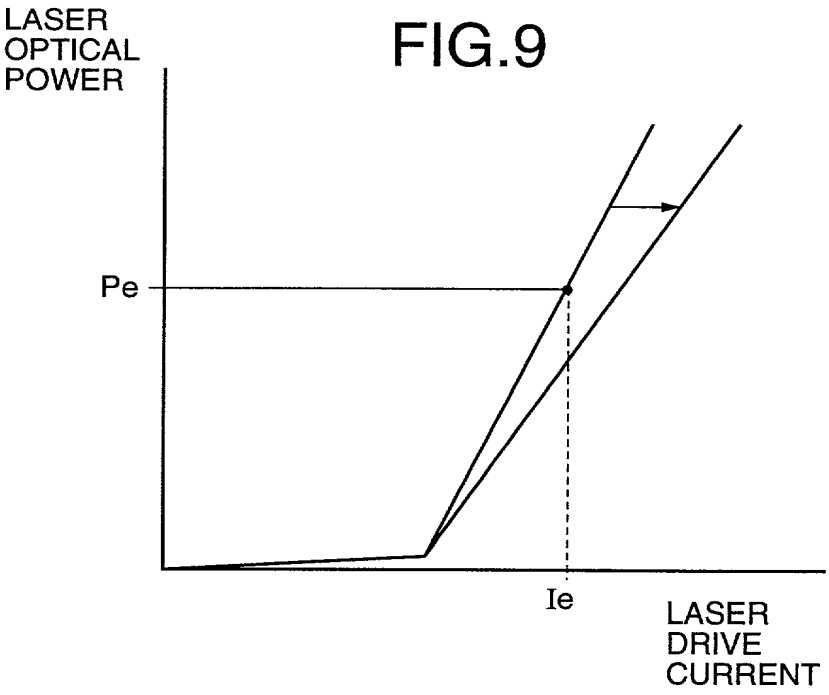


FIG.9



EP 0 550 280 A1

FIG.10

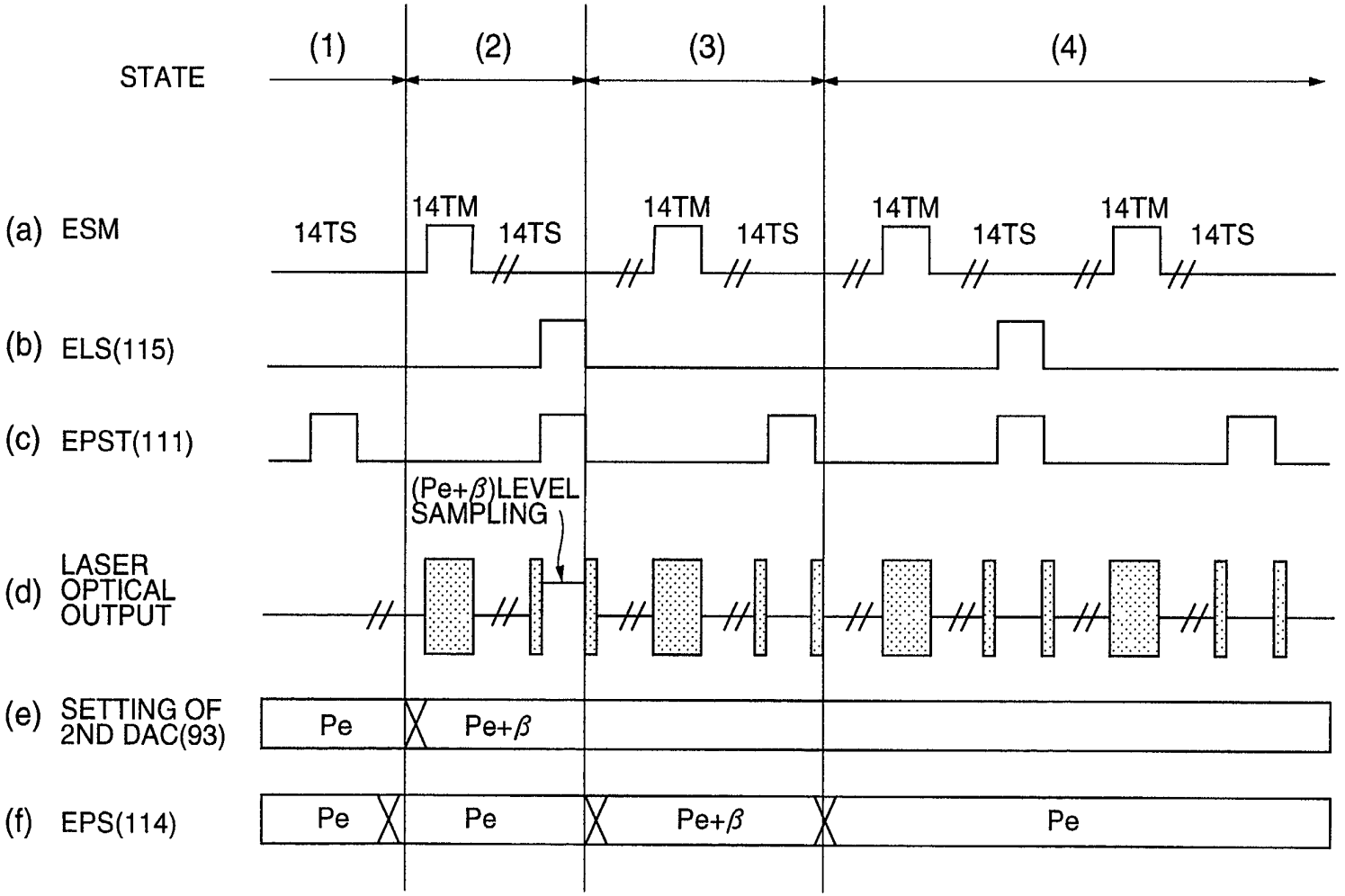

STATE
(1)
(2)
(3)
(4)
(a) ESM
14TS
14TM
14TS
14TM
14TS
14TM
14TS
14TM
14TS
(b) ELS(115)
(c) EPST(111)
(Pe+β)LEVEL SAMPLING
(d) LASER OPTICAL OUTPUT
(e) SETTING OF 2ND DAC(93)
Pe
Pe+β
(f) EPS(114)
Pe
Pe
Pe+β
Pe

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FIG.11 PRIOR ART

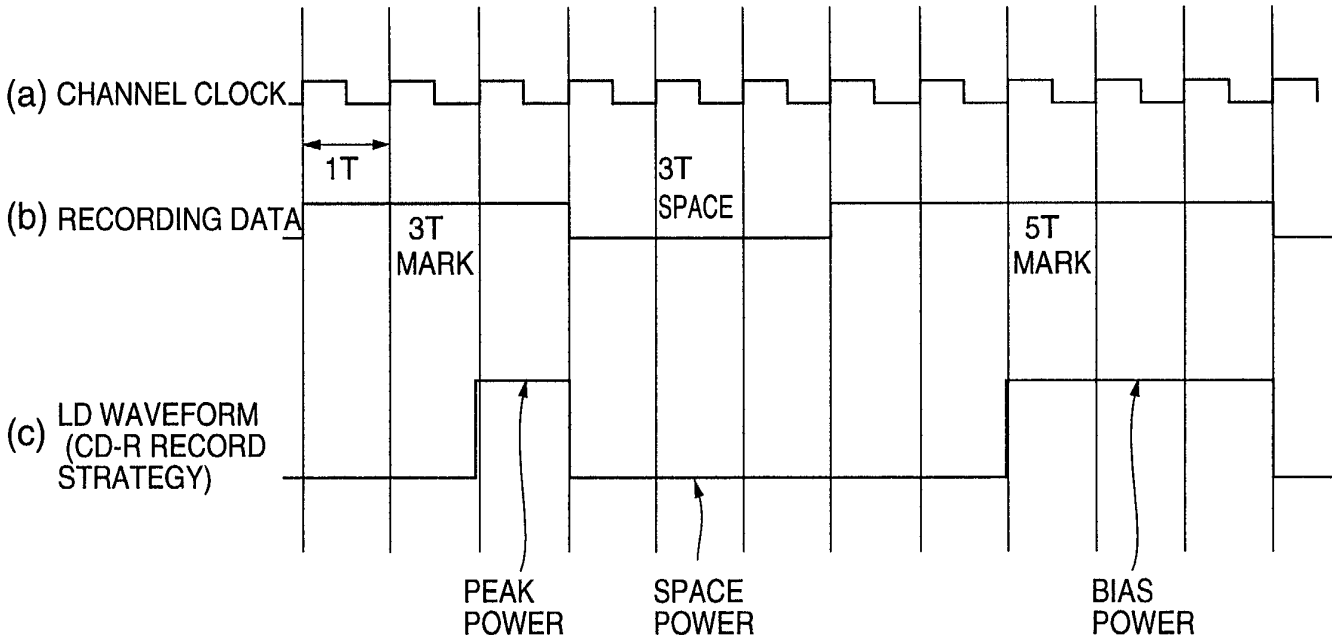

FIG.12A

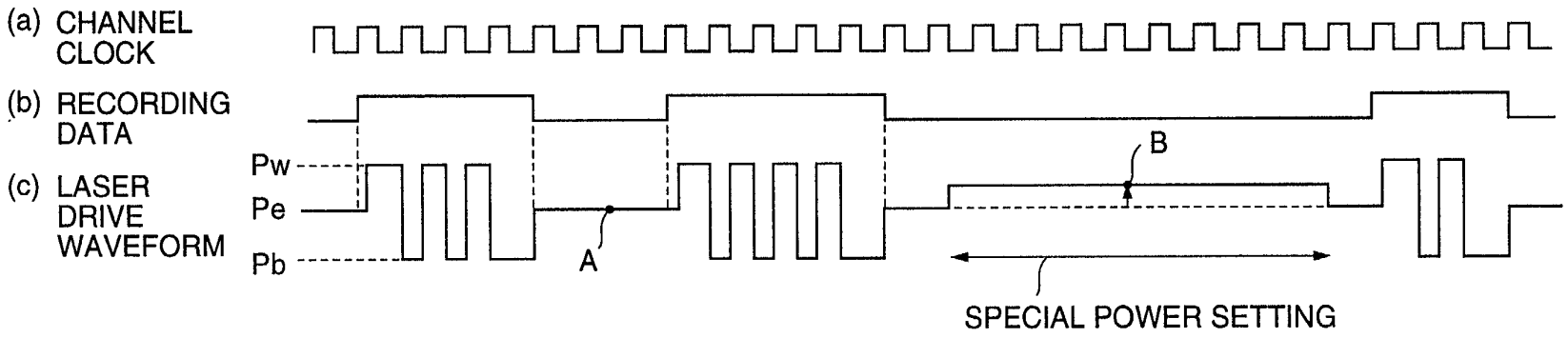

FIG.12B

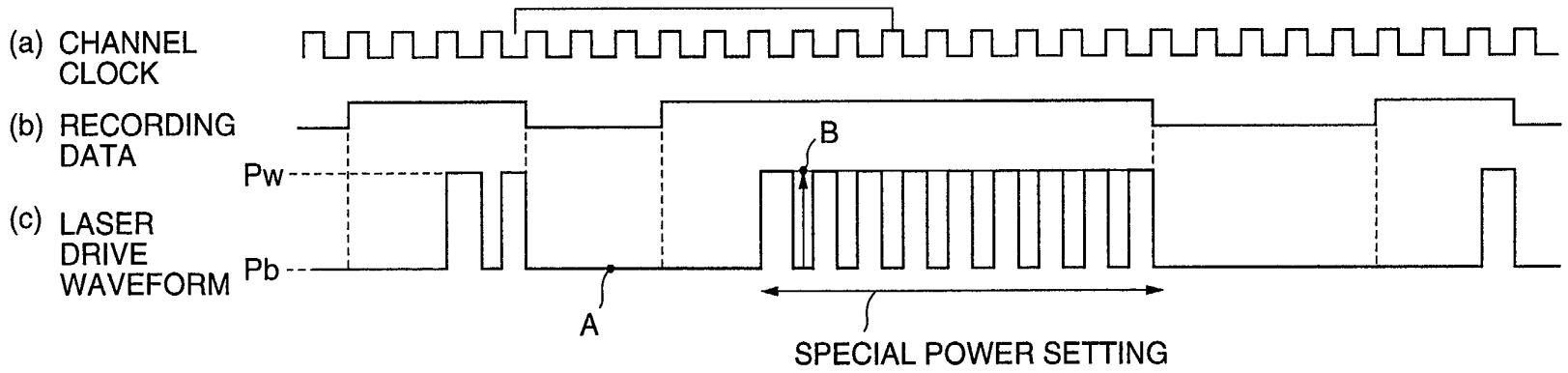

FIG.13

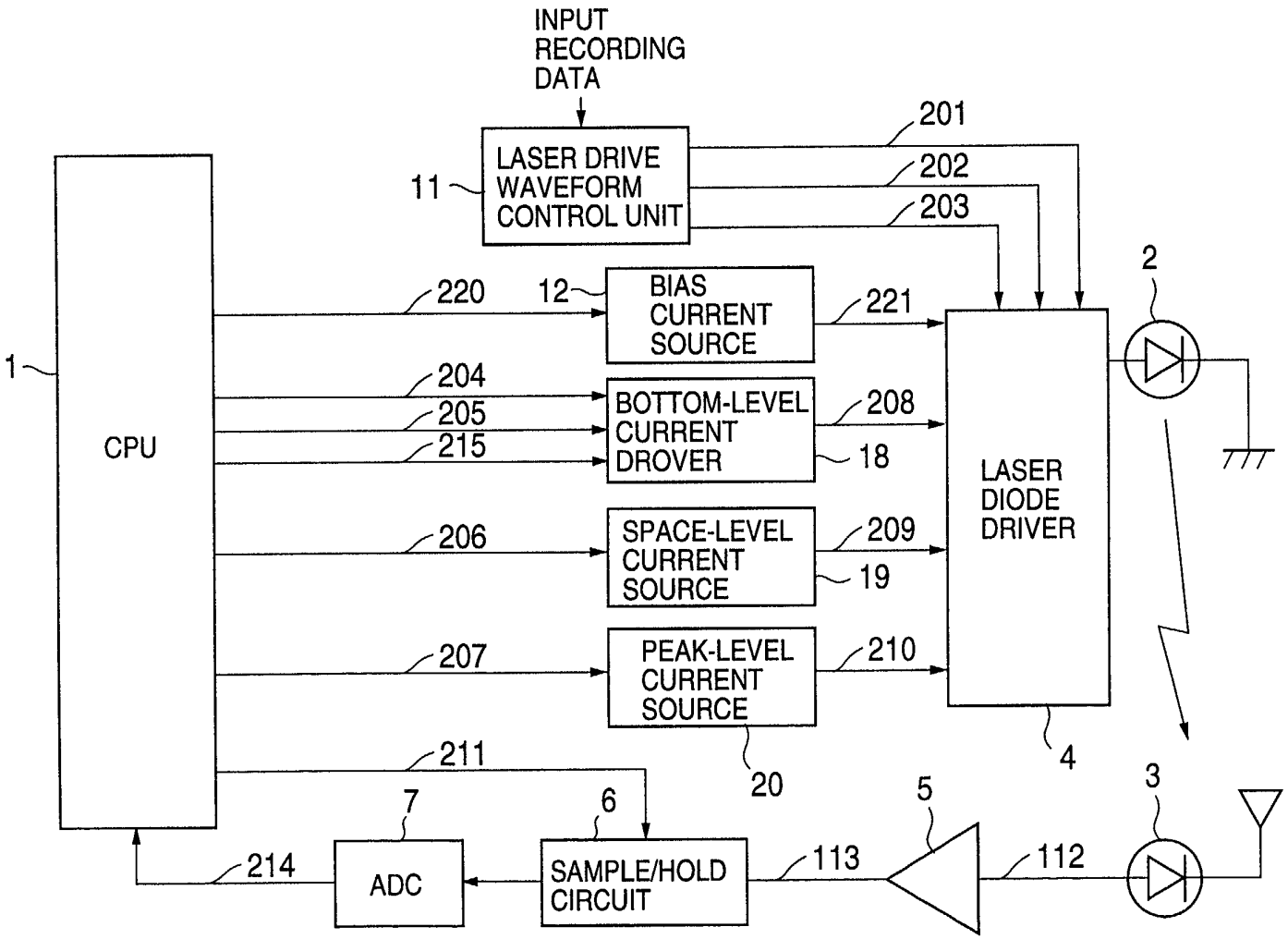
INPUT
RECORDING
DATA
LASER DRIVE
WAVEFORM
CONTROL UNIT
11
201
202
203
CPU
1
220
12
BIAS
CURRENT
SOURCE
221
2
204
205
215
BOTTOM-LEVEL
CURRENT
DROVER
208
18
LASER
DIODE
DRIVER
206
SPACE-LEVEL
CURRENT
SOURCE
209
19
207
PEAK-LEVEL
CURRENT
SOURCE
210
20
4
211
7
6
5
3
214
ADC
SAMPLE/HOLD
CIRCUIT
113
112

FIG.14

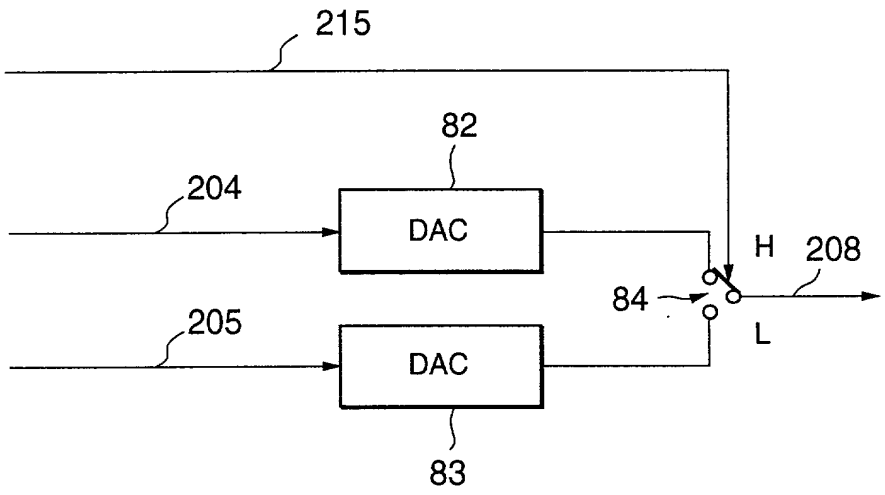

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FIG.15

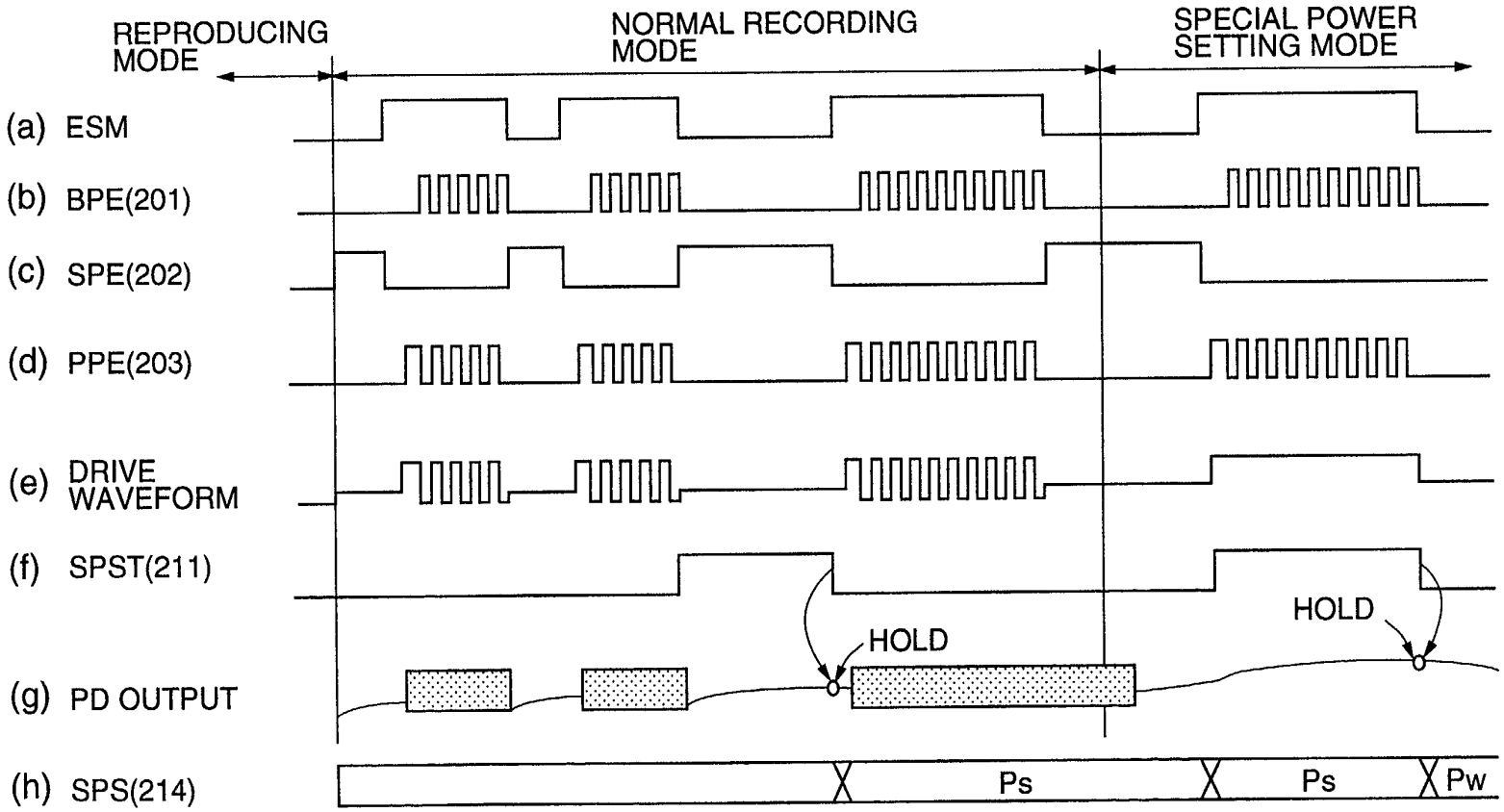


FIG.16

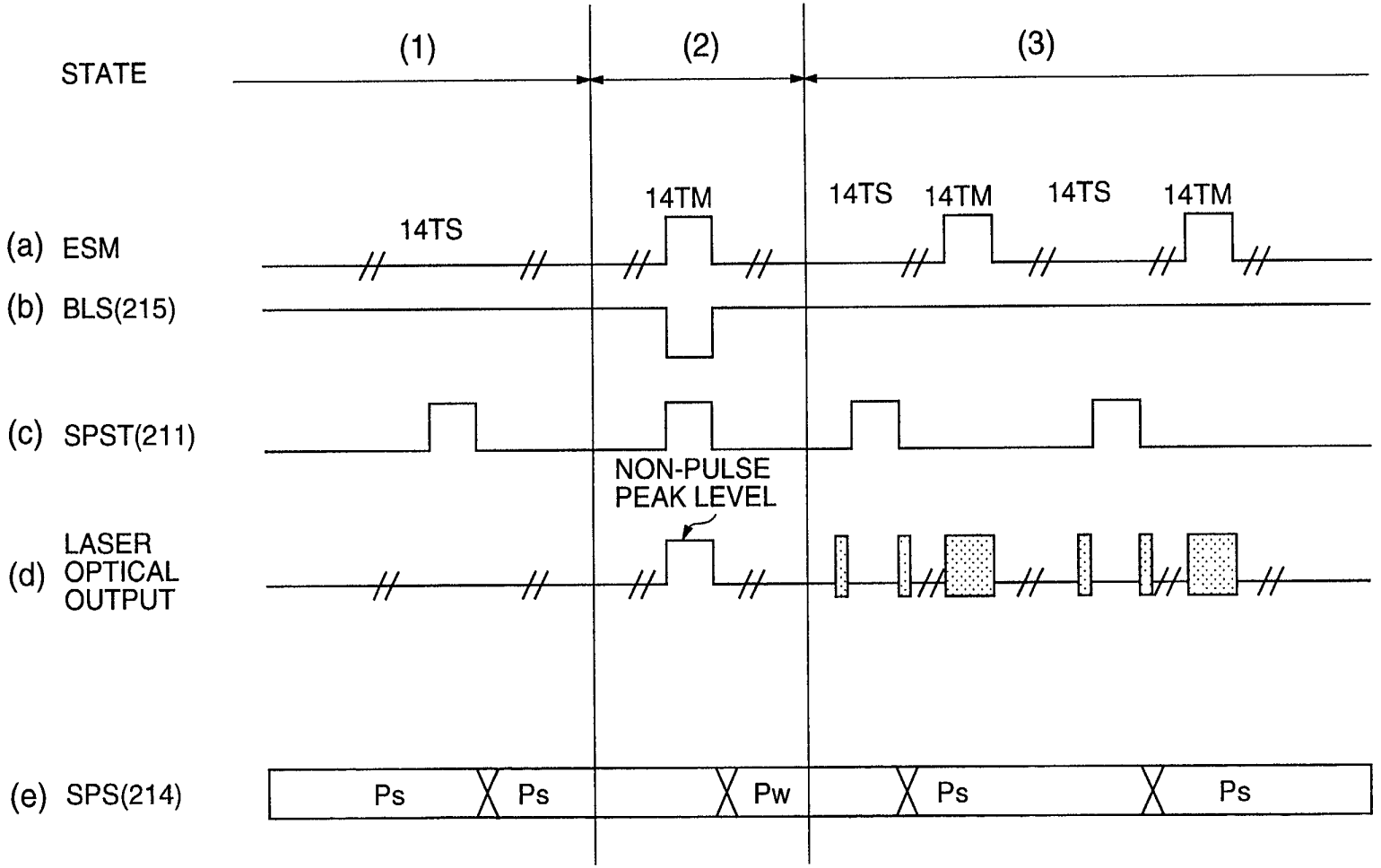

STATE
(1)
(2)
(3)
(a) ESM
14TS
14TM
14TS
14TM
14TS
14TM
(b) BLS(215)
(c) SPST(211)
NON-PULSE
PEAK LEVEL
(d) LASER
OPTICAL
OUTPUT
(e) SPS(214)
Ps
Ps
Pw
Ps
Ps

FIG.17

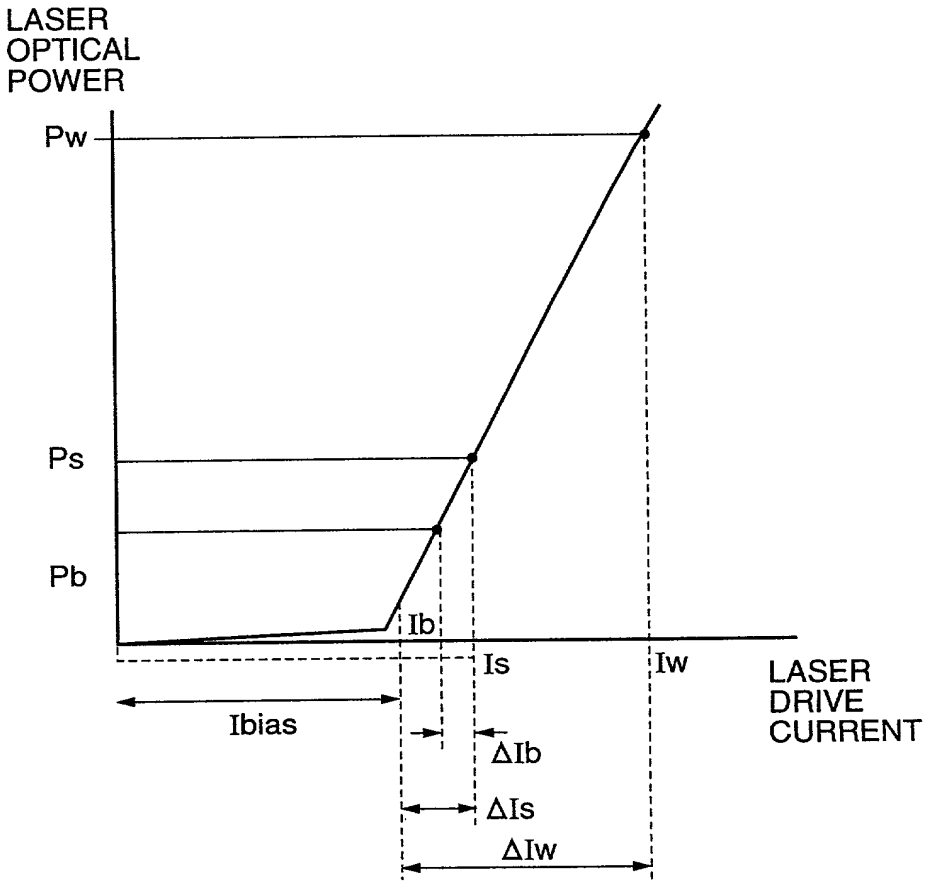
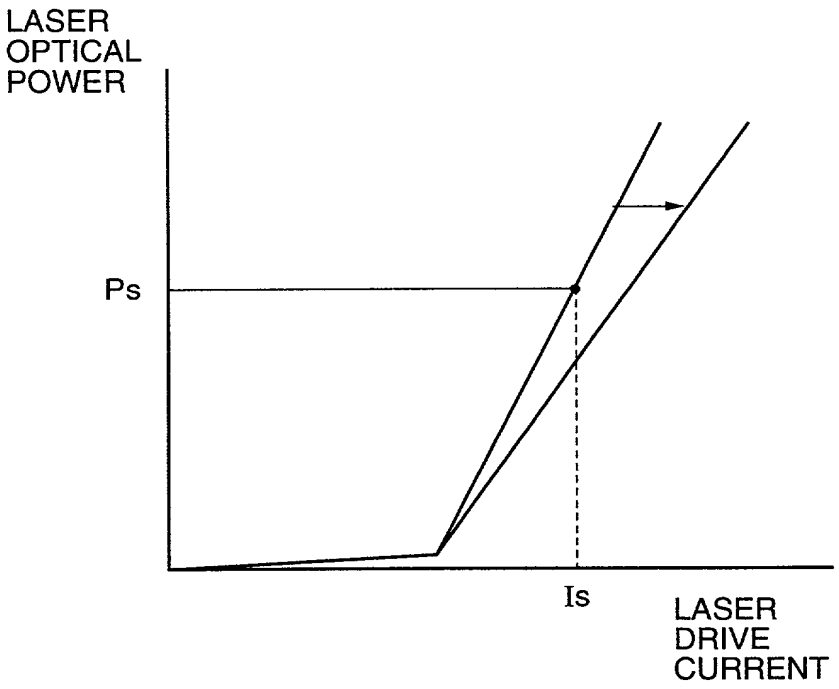

LASER
OPTICAL
POWER
Pw
Ps
Pb
Ib
Is
Iw
LASER
DRIVE
CURRENT
Ibias
ΔIb
ΔIs
ΔIw

FIG.18



EPO5D 2805P5D

FIG.19

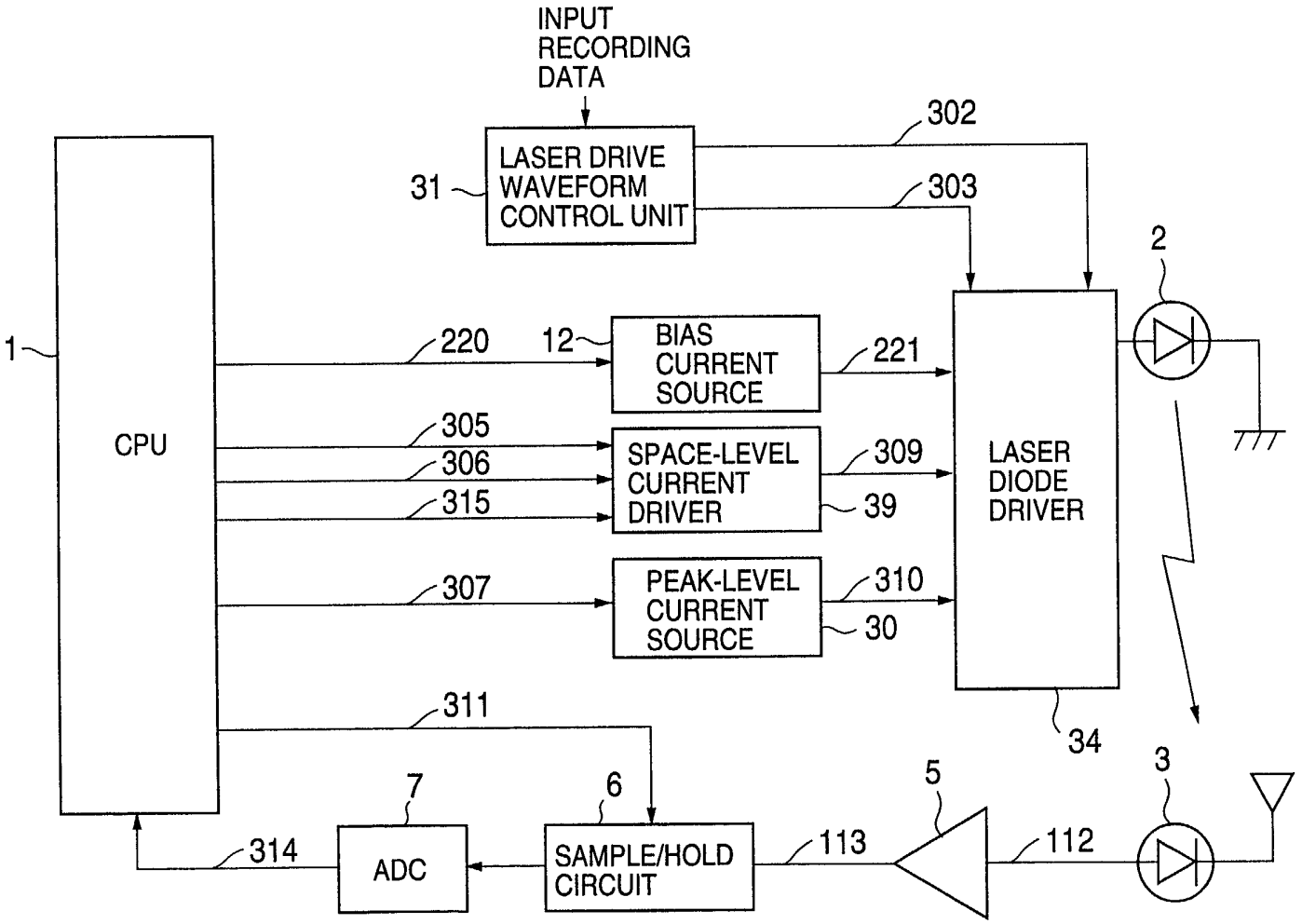

INPUT
RECORDING
DATA
LASER DRIVE
WAVEFORM
CONTROL UNIT
31
302
303
2
1
CPU
220
12
BIAS
CURRENT
SOURCE
221
305
306
315
SPACE-LEVEL
CURRENT
DRIVER
309
39
LASER
DIODE
DRIVER
307
PEAK-LEVEL
CURRENT
SOURCE
310
30
311
34
3
7
6
5
314
ADC
SAMPLE/HOLD
CIRCUIT
113
112

FIG.20

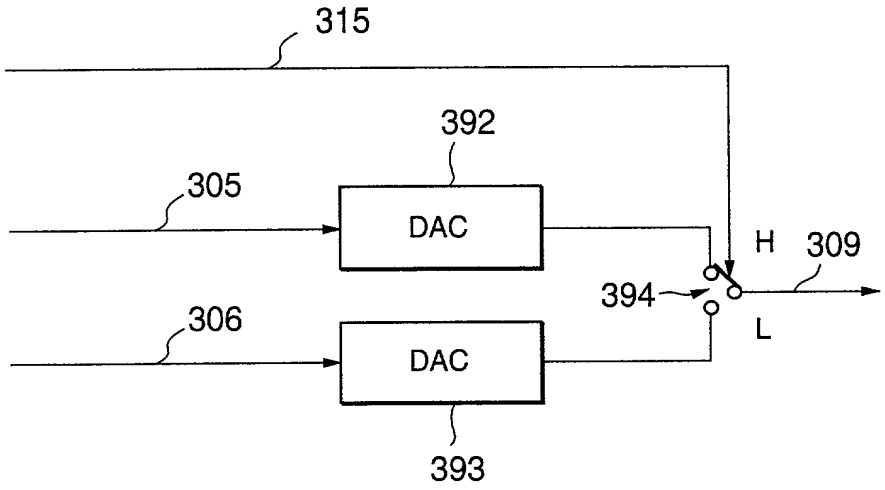


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FIG.21

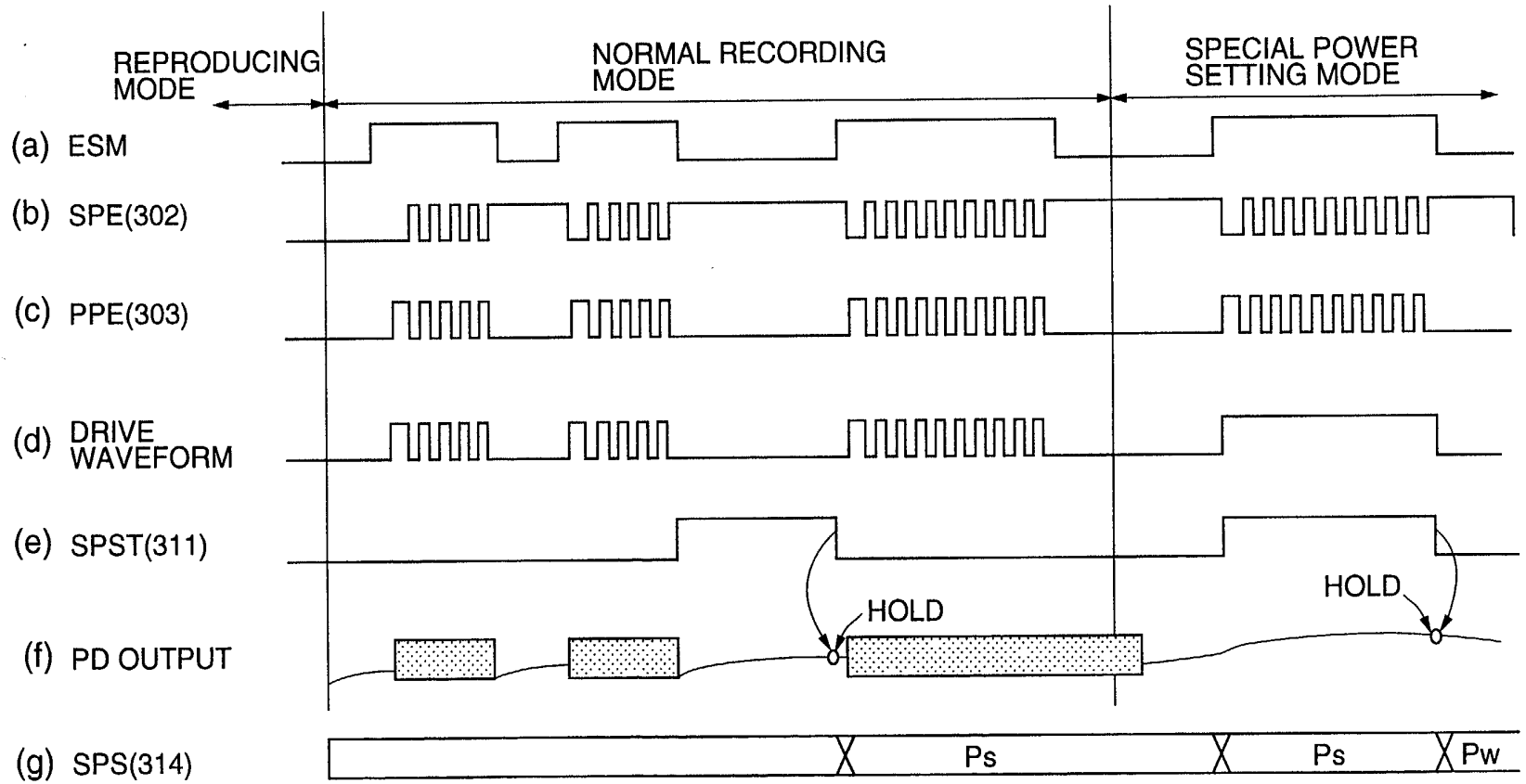


FIG.22

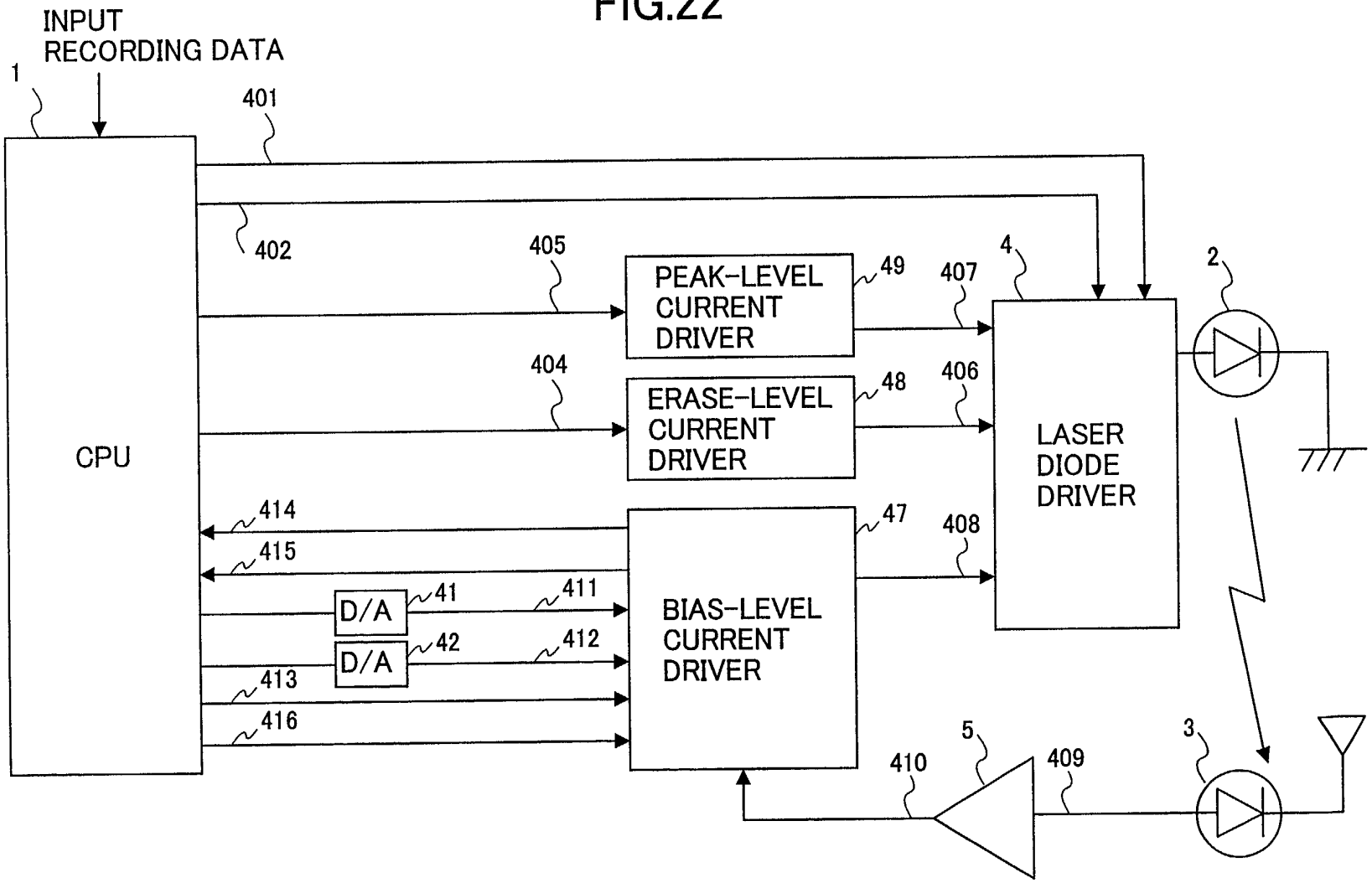

INPUT
RECORDING DATA
1
401
402
405
PEAK-LEVEL
CURRENT
DRIVER
49
407
4
2
404
ERASE-LEVEL
CURRENT
DRIVER
48
406
CPU
LASER
DIODE
DRIVER
414
415
47
408
D/A
41
411
D/A
42
412
413
416
BIAS-LEVEL
CURRENT
DRIVER
5
3
410
409

FIG.23

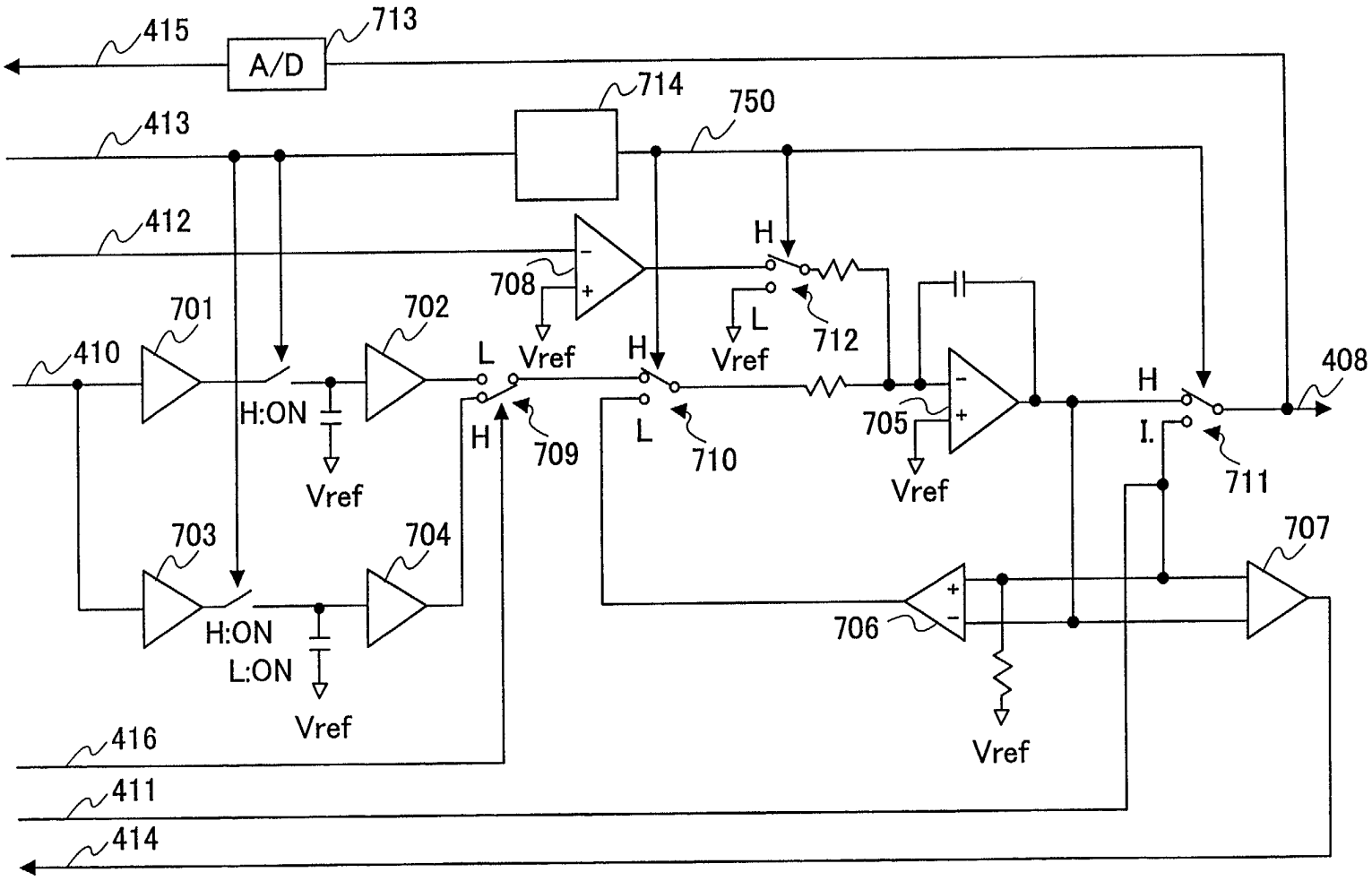

415
A/D
713
714
750
413
412
H
708
701
702
410
L
Vref
H
Vref
712
408
H:ON
H
709
L
710
705
H
I.
711
Vref
Vref
703
704
707
H:ON
L:ON
706
Vref
416
411
414

FIG.24

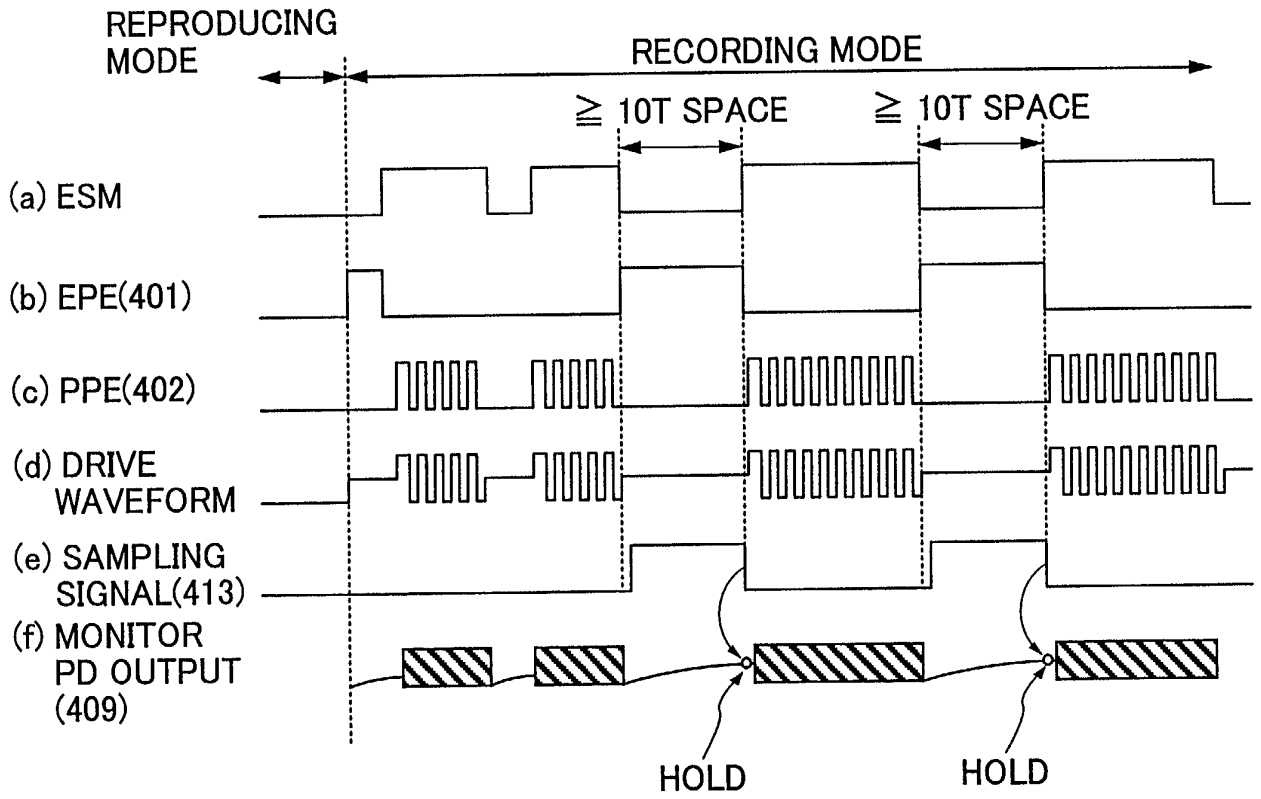

REPRODUCING MODE
RECORDING MODE
≧ 10T SPACE
≧ 10T SPACE
(a) ESM
(b) EPE(401)
(c) PPE(402)
(d) DRIVE WAVEFORM
(e) SAMPLING SIGNAL(413)
(f) MONITOR PD OUTPUT (409)
HOLD
HOLD

FIG.25

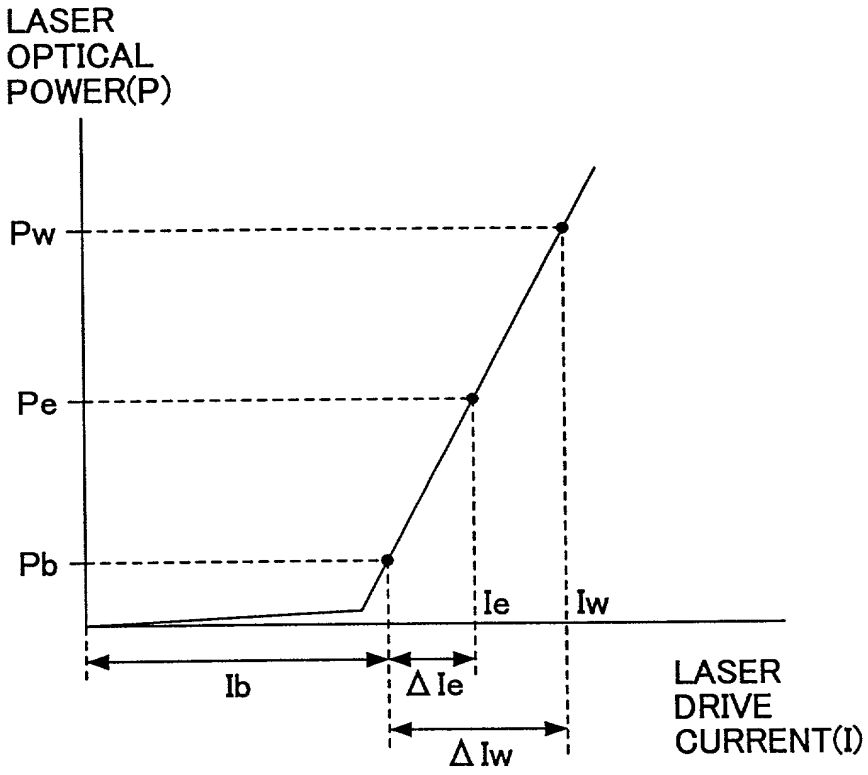

LASER
OPTICAL
POWER(P)
Pw
Pe
Pb
Ie
Iw
Ib
Δ Ie
Δ Iw
LASER
DRIVE
CURRENT(I)

FIG.26

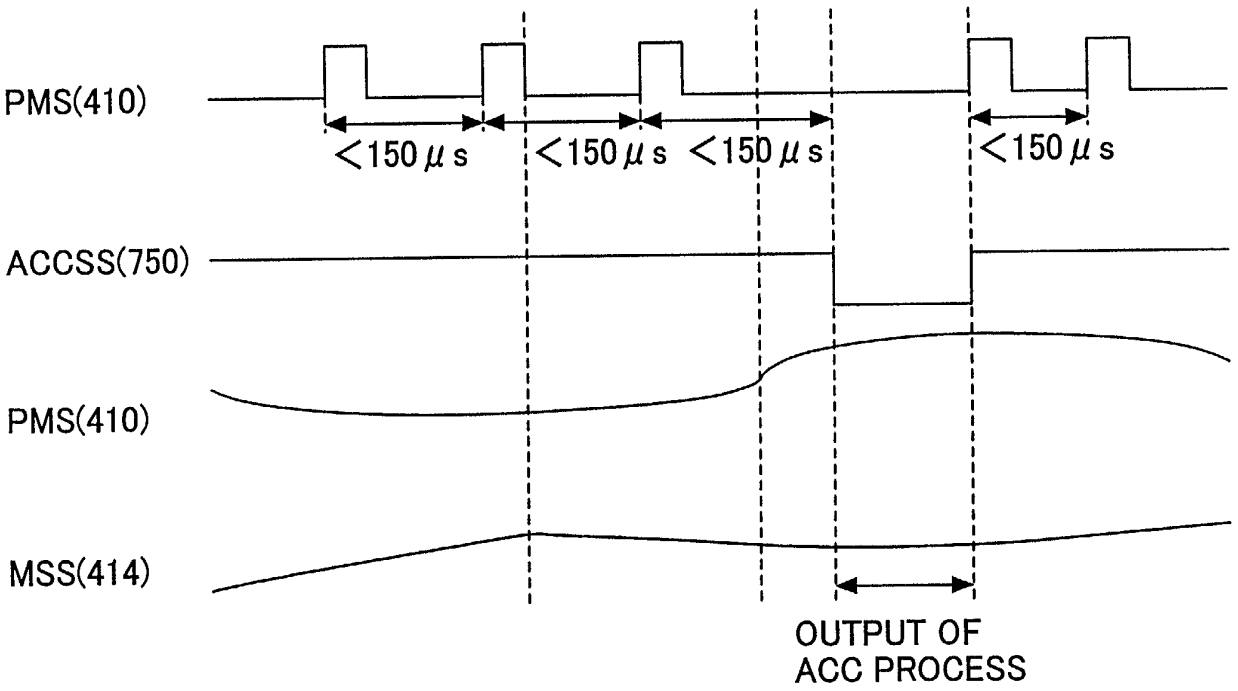

PMS(410)
<150 μs
<150 μs
<150 μs
<150 μs
ACCSS(750)
PMS(410)
MSS(414)
OUTPUT OF
ACC PROCESS

FIG.27

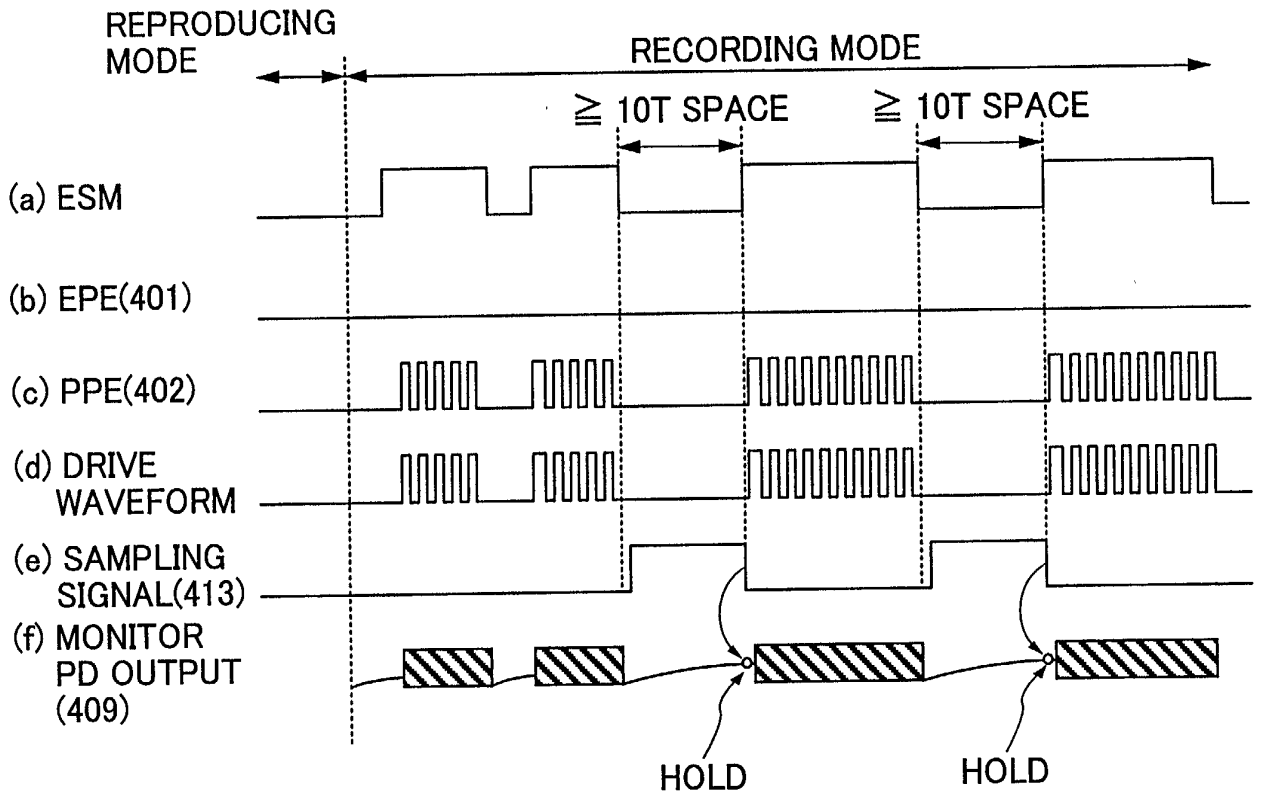

REPRODUCING MODE
RECORDING MODE
≧ 10T SPACE
≧ 10T SPACE
(a) ESM
(b) EPE(401)
(c) PPE(402)
(d) DRIVE WAVEFORM
(e) SAMPLING SIGNAL(413)
(f) MONITOR PD OUTPUT (409)
HOLD
HOLD

FIG.28

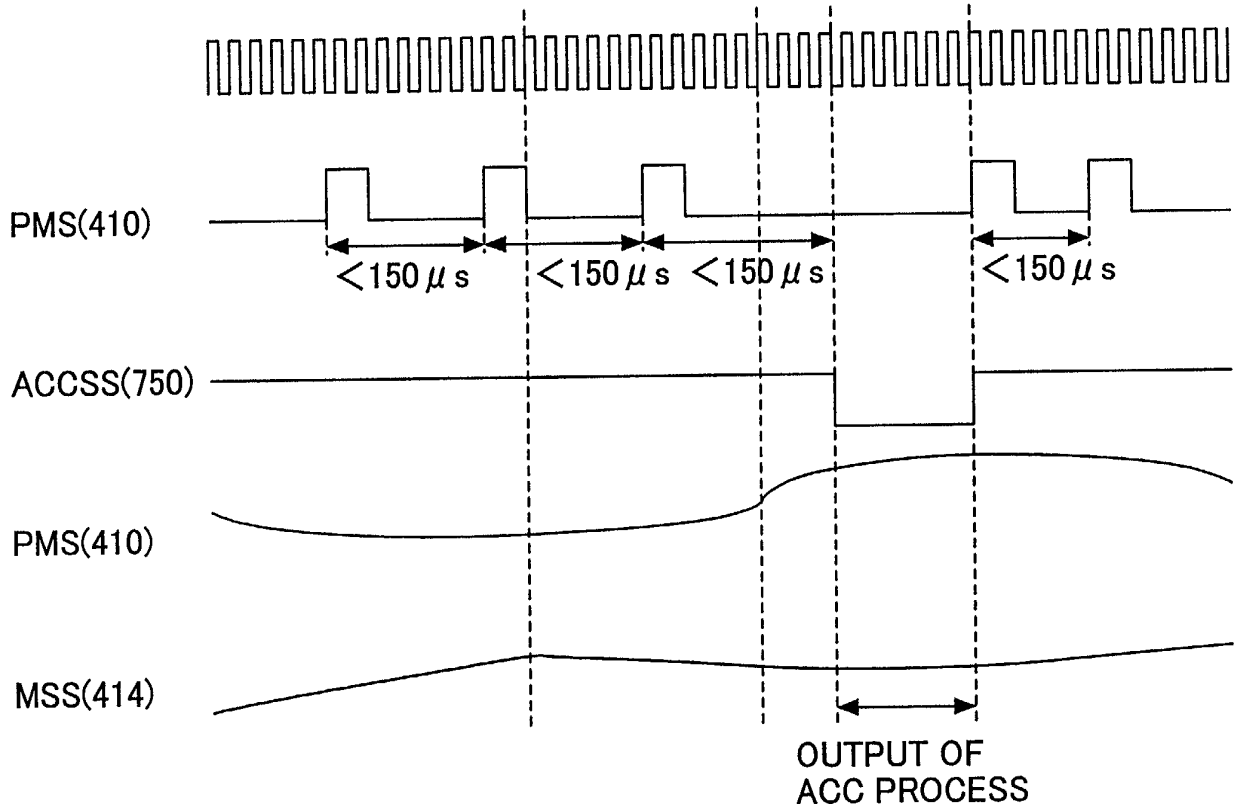

PMS(410)
<150 μs
<150 μs
<150 μs
<150 μs
ACCSS(750)
PMS(410)
MSS(414)
OUTPUT OF
ACC PROCESS

FIG.29

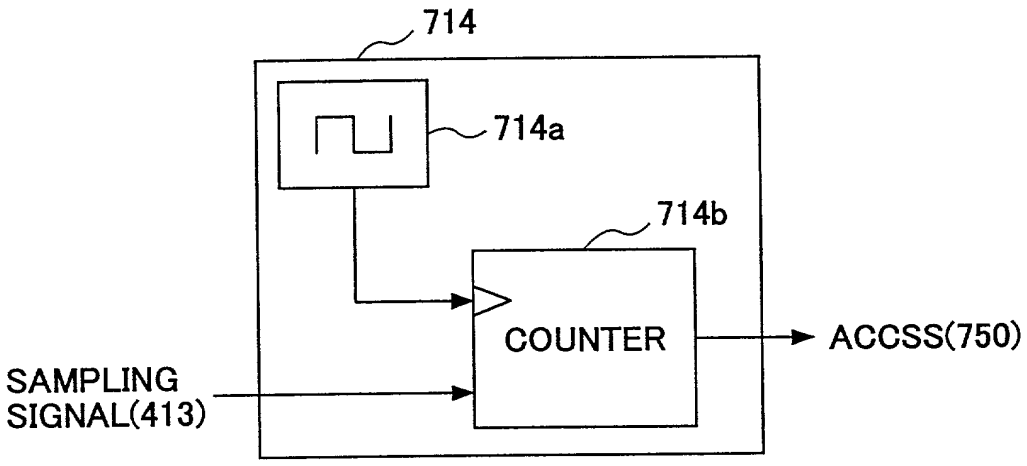


FIG.30

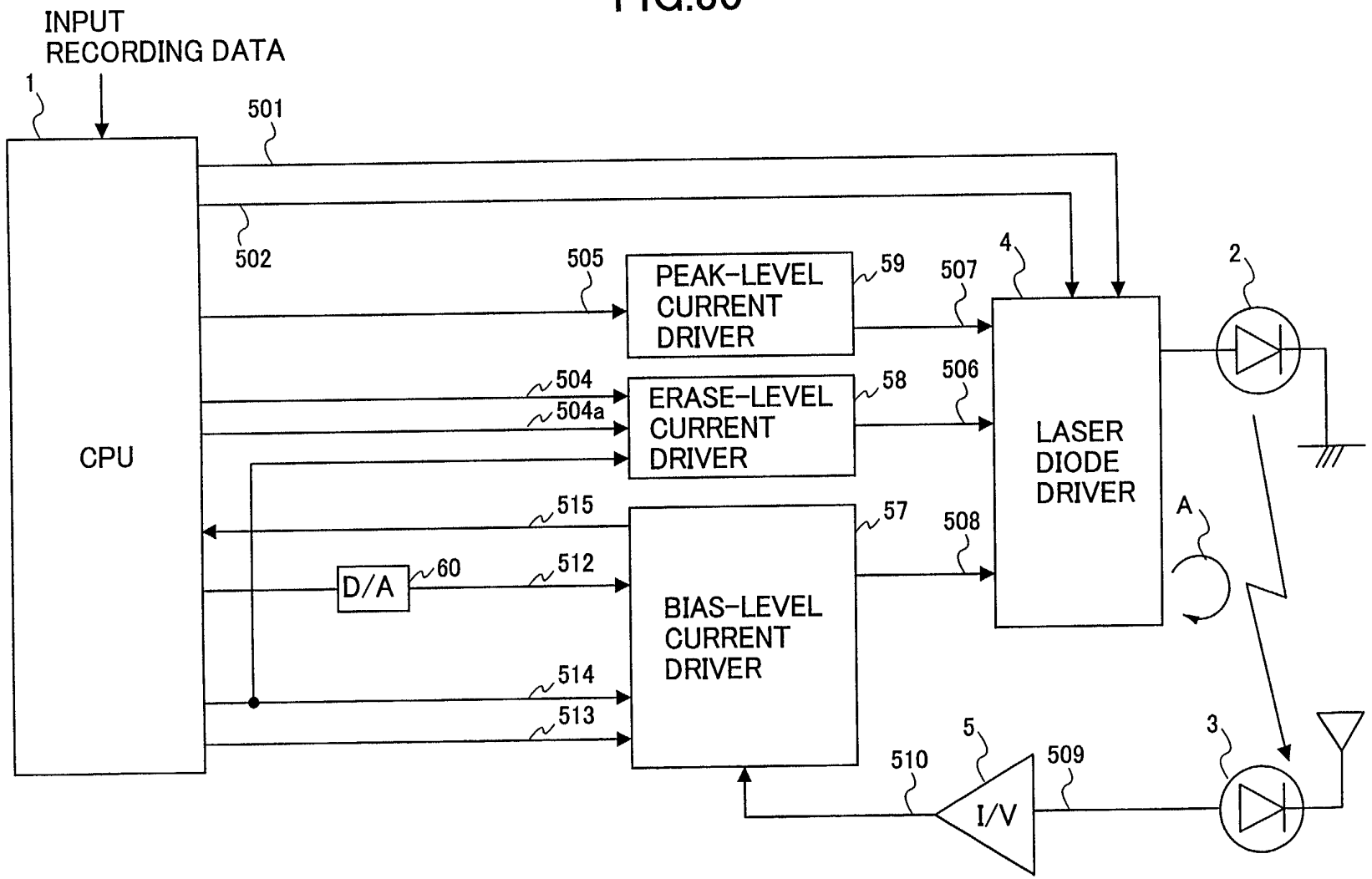

INPUT
RECORDING DATA
1
501
502
505
PEAK-LEVEL
CURRENT
DRIVER
59
507
4
2
504
504a
ERASE-LEVEL
CURRENT
DRIVER
58
506
CPU
LASER
DIODE
DRIVER
A
515
D/A
60
512
BIAS-LEVEL
CURRENT
DRIVER
57
508
514
513
5
3
510
I/V
509

FIG.31

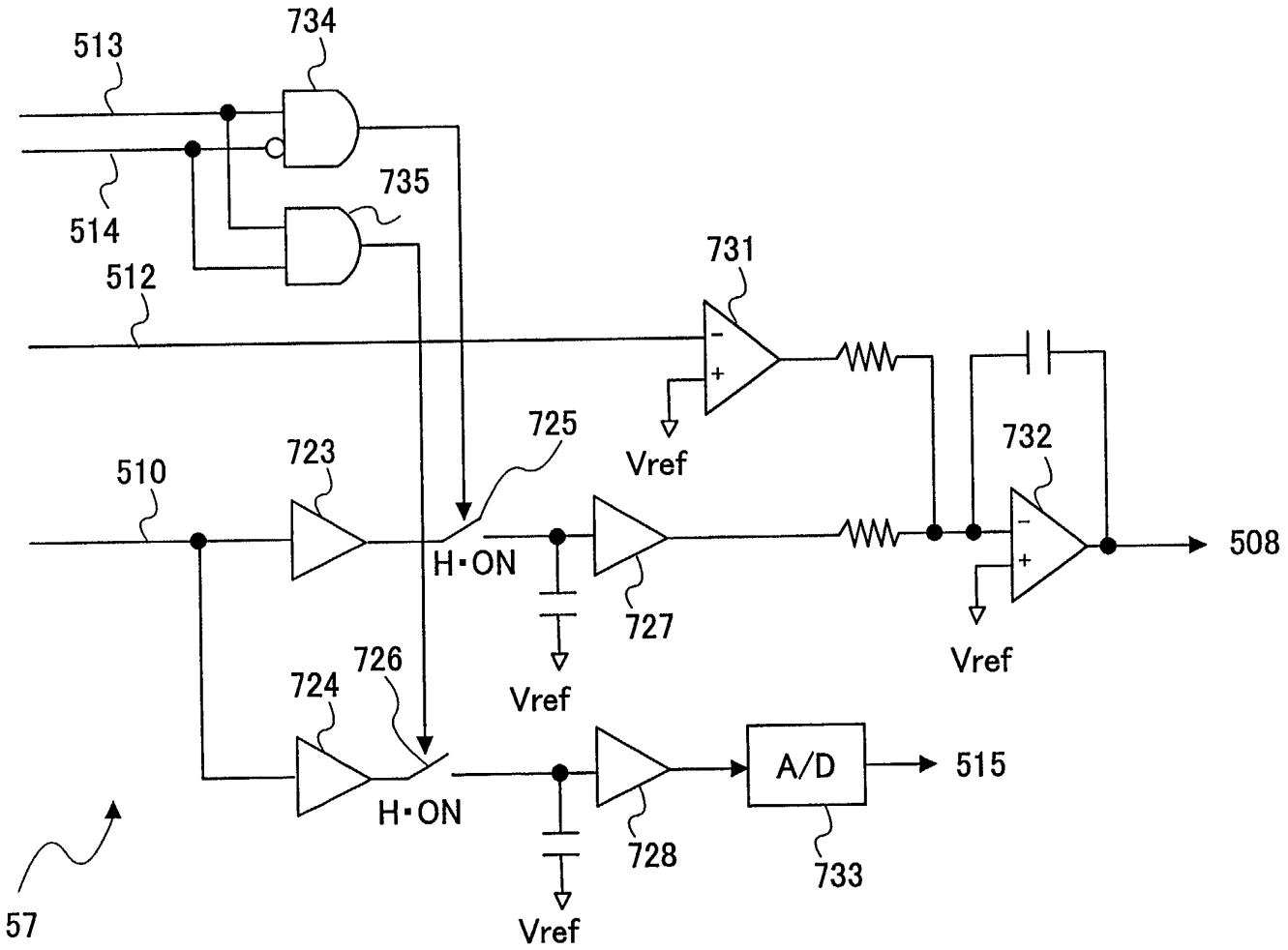

513
734
514
735
512
731
Vref
725
510
723
732
H・ON
508
727
Vref
726
724
Vref
A/D
515
H・ON
728
733
57
Vref

FIG.32

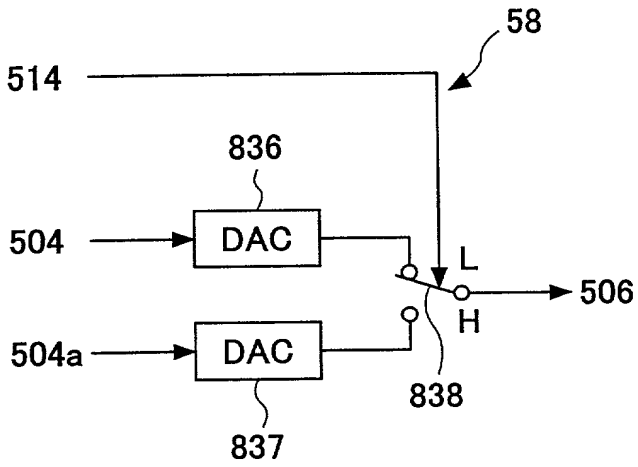


FIG.33

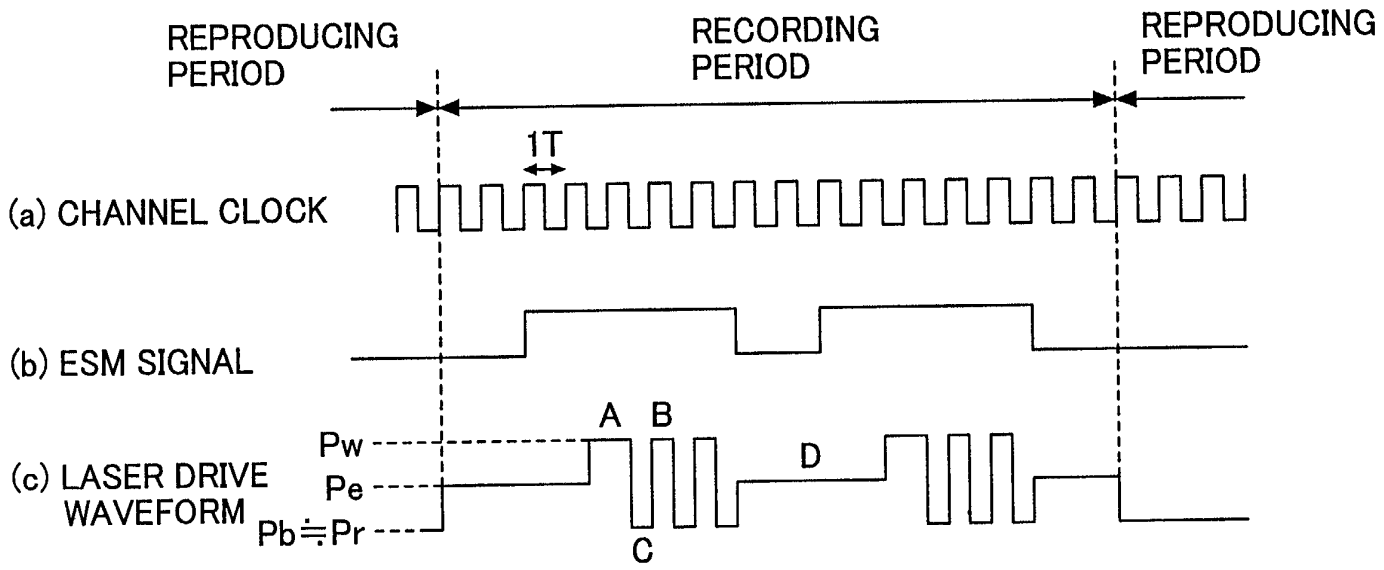

REPRODUCING PERIOD
RECORDING PERIOD
REPRODUCING PERIOD
1T
(a) CHANNEL CLOCK
(b) ESM SIGNAL
(c) LASER DRIVE WAVEFORM
Pw
Pe
Pb≒Pr
A
B
C
D

FIG.34

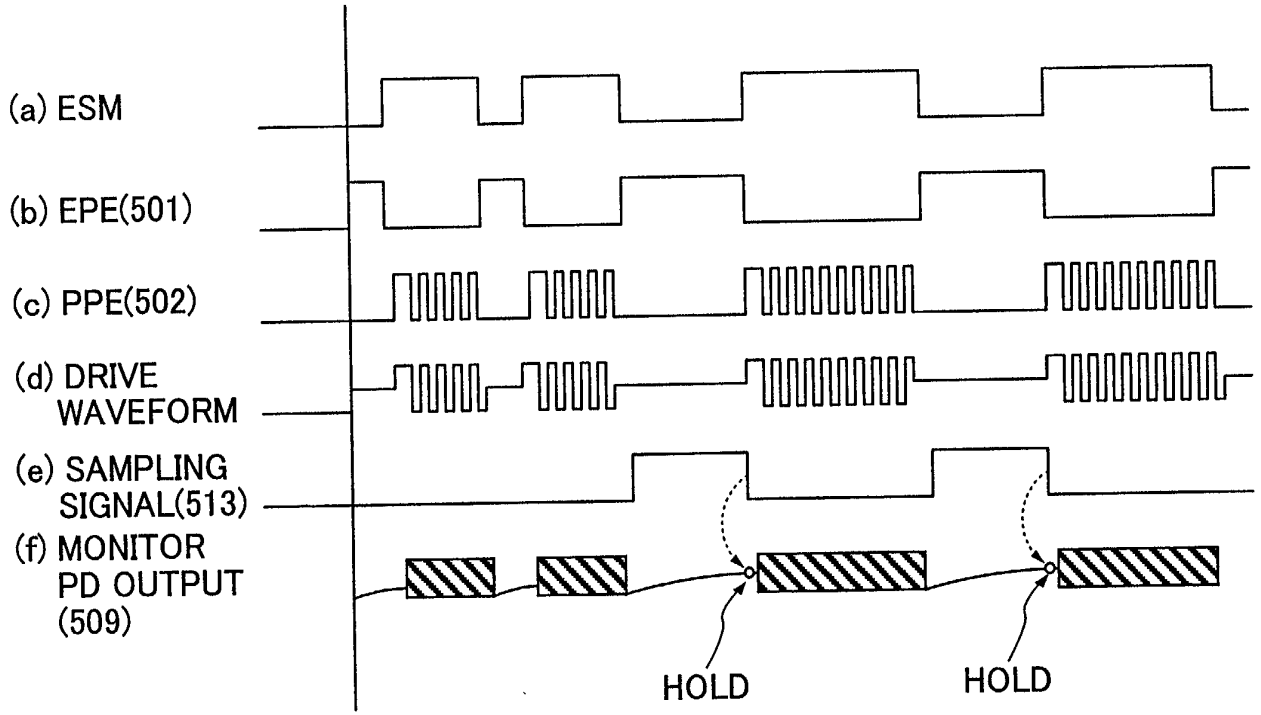

(a) ESM
(b) EPE(501)
(c) PPE(502)
(d) DRIVE WAVEFORM
(e) SAMPLING SIGNAL(513)
(f) MONITOR PD OUTPUT (509)
HOLD
HOLD

FIG.35

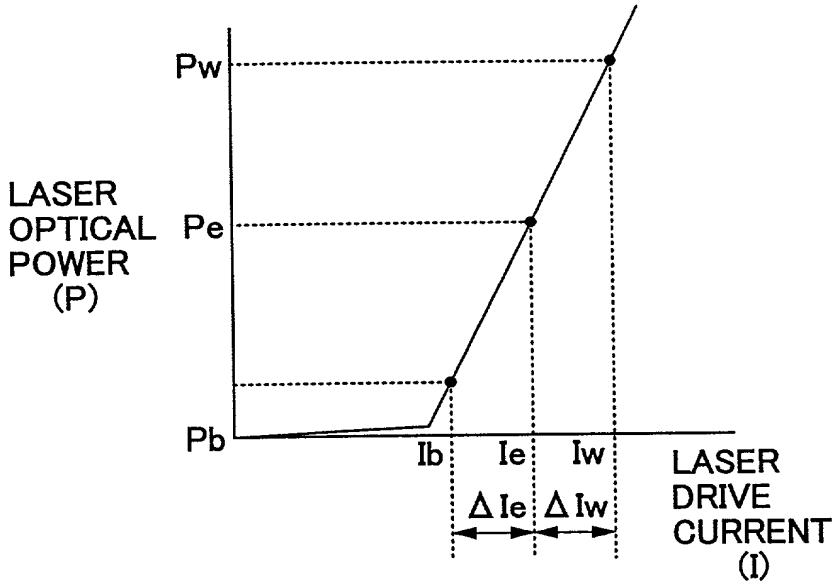
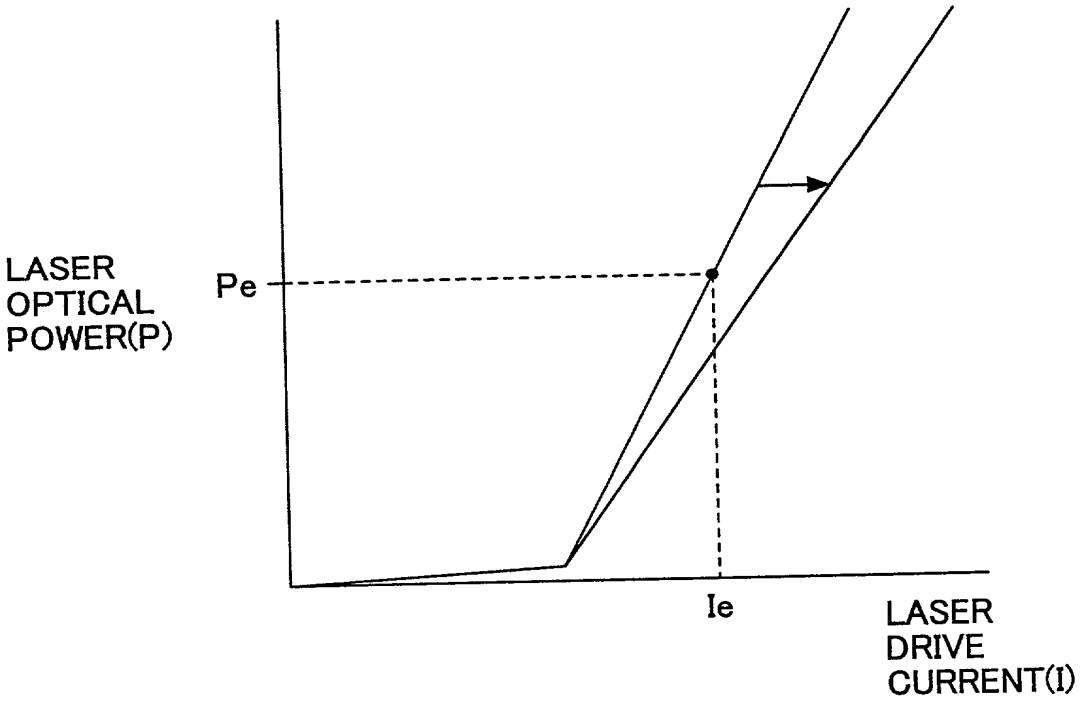

Pw
Pe
Pb
LASER
OPTICAL
POWER
(P)
Ib
Ie
Iw
ΔIe
ΔIw
LASER
DRIVE
CURRENT
(I)

FIG.36



EP 0 955 628 A2

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FIG.37

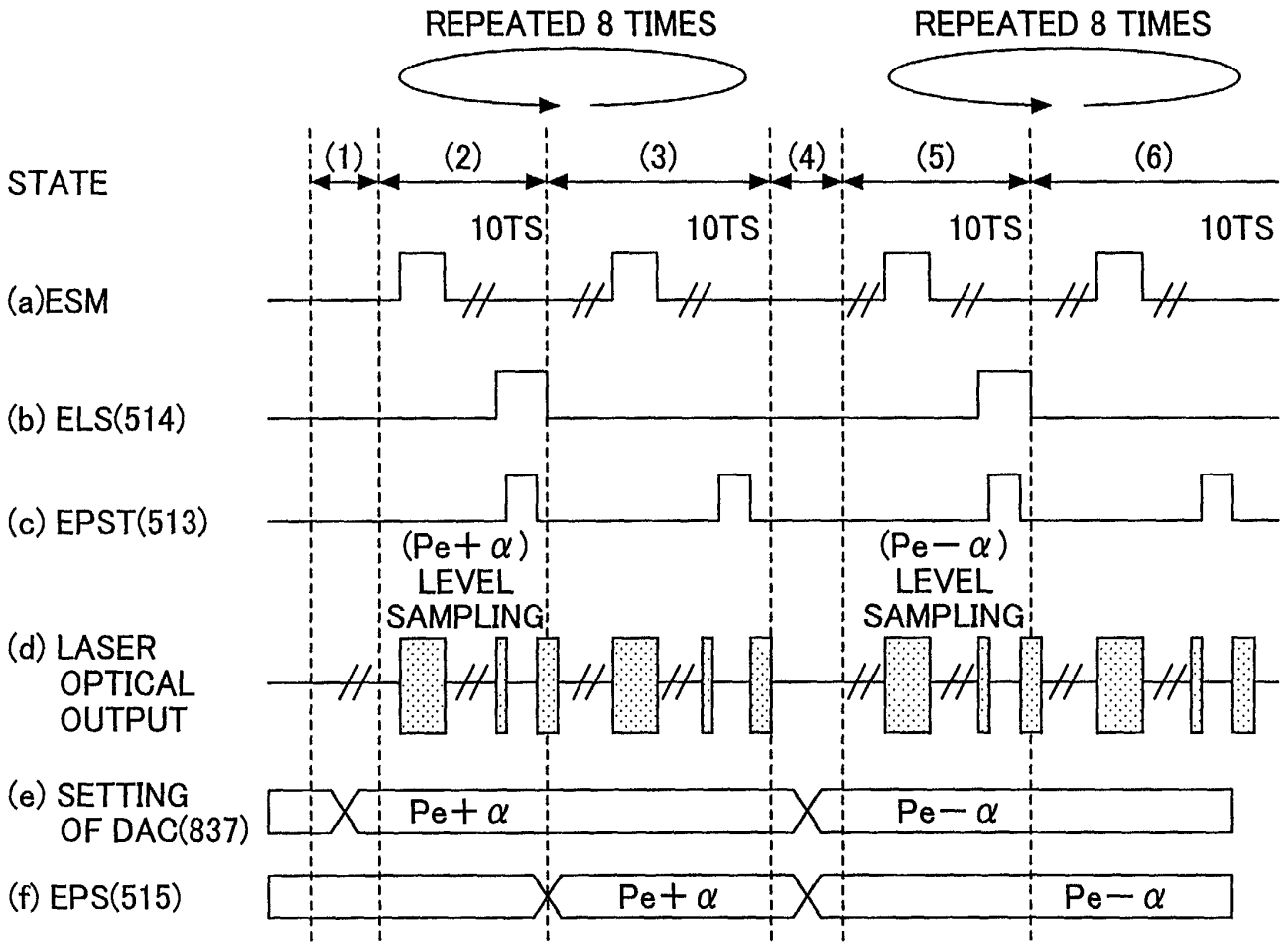


FIG.38

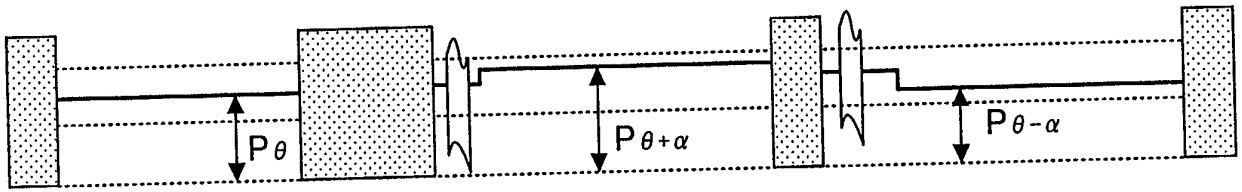
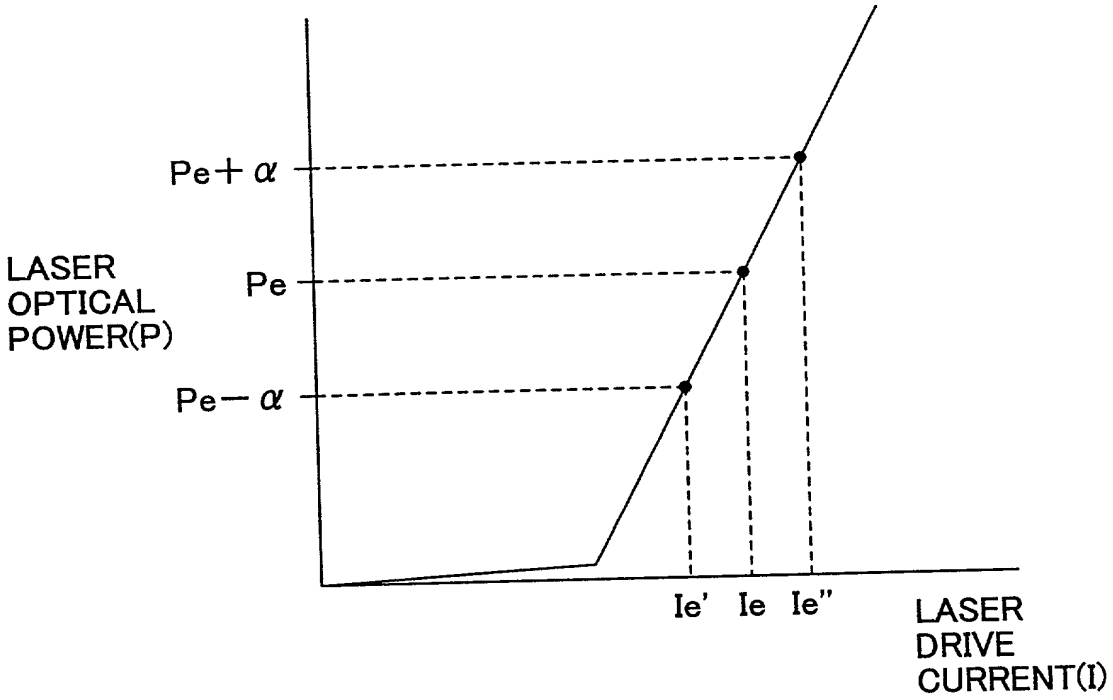


FIG.39


Pe+α
Pe
Pe−α
LASER
OPTICAL
POWER(P)
Ie'
Ie
Ie"
LASER
DRIVE
CURRENT(I)